A CROSS SECTIONAL STUDY OF THE PHYSICAL MORBIDITY AND THEIR RISK FACTORS IN FISHERMEN OF CHENNAI DISTRICT, 2014

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CERTIFICATE OF THE GUIDE

This is to certify that the dissertation titled **"A CROSS SECTIONAL STUDY OF THE PHYSICAL MORBIDITY AND THEIR RISK FACTORS IN FISHERMEN OF CHENNAI DISTRICT, 2014"** is a bonafide work carried out by **Dr. M.GOPAL**, Post Graduate student in the Institute of Community Medicine, Madras Medical College, Chennai-3, under my supervision and guidance towards partial fulfillment of the requirements for the degree of M.D. Branch XV Community Medicine and is being submitted to The Tamil Nadu Dr.M.G.R. Medical University, Chennai.

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DECLARATION

I, solemnly declare that the dissertation titled **"A CROSS SECTIONAL STUDY OF THE PHYSICAL MORBIDITY AND THEIR RISK FACTORS IN FISHERMEN OF CHENNAI DISTRICT, 2014",** was done by me under the guidance and supervision of Dr.V.V. Anantharaman, B.Sc., M.D., M.Med, M.B.A., D.P.H., D.D., Director, Institute of Community Medicine, Madras Medical College, Chennai-3. The dissertation is submitted to The Tamil Nadu Dr. M.G.R. Medical University towards the partial fulfilment of the requirement for the award of M.D. degree (Branch XV) in Community Medicine.

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ABBREVIATIONS

BMI	-	Body Mass Index
C I	-	Confidence Interval
CMFRI	-	Central Marine Fisheries Research Institute
CVD	-	Cardiovascular Disease
DM	-	Diabetes Mellitus
DALY	-	Disability adjusted life years
DBP	-	Diastolic Blood Pressure
EPIC	-	European Prospective Investigation into Cancer and Nutrition
GDP	-	Gross Domestic Product
HDL	-	High density lipoprotein
HT	-	Hypertension
ICMR	-	Indian Council of Medical Research
IGT	-	Impaired Glucose Tolerance
IFG	-	Impaired Fasting Glucose
JNC	-	Joint National Committee
MSD	-	Musculoskeletal Disorder
NCD	-	Non communicable disease
NSSO	-	National Sample Survey Office
OR	-	Odds Ratio
PPBS	-	Post prandial Blood sugar
PPE	-	Personal protective equipment
SBP	-	Systolic Blood Pressure
STEPS	-	STEPwise approach to Surveillance
VI	-	Visual Impairment
WC	-	Waist Circumference
WHO	-	World Health Organisation
X^2	-	Chi Square value

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ABSTRACT

A CROSS SECTIONAL STUDY OF THE PHYSICAL MORBIDITY AND THEIR RISK FACTORS IN FISHERMEN OF CHENNAI DISTRICT, 2014

Background:

Fishing is a hazardous occupation. The nature of the work and the surrounding environment in fishing makes the fishermen prone for a lot of health disorders. These health related morbidity have a serious consequences in the life of the fishermen population. Hypertension, Diabetes Mellitus, musculoskeletal disorders, visual and hearing impairment are some of the important diseases by which the fishermen population are affected. According to WHO, these diseases are considered to be of public health importance. Nearly one in five individuals of the coastal population were suffering with chronic diseases. The prevalence of hypertension in fishermen population ranged from 4 to 45% and musculoskeletal disorders around 30%. Therefore there is an urgent need to understand the common health related morbidity of the fishermen population and to provide for the occupational health services to screen and diagnose the chronic diseases in the fishermen community at the earliest.

Objectives:

To estimate the prevalence of physical morbidity and their associated risk factors in fishermen of Chennai district. 2014

Materials and methods:

A community based cross sectional study was done among fishermen in coastal area of Chennai District during June 2014 to August 2014. 519 fishermen in the 16 fishing villages were selected by multistage cluster sampling method. In each fishing village, around 33 fishermen were selected for the study. History related to their socio-demographic details, occupational characteristics, their personal habits were asked with the aid of the semi structured questionnaire and also their physical parameters were measured. The association between various factors and physical morbidity were analyzed by using Chi Square test.

Results:

The results of the study showed that the highest prevalence for physical morbidity in the fishermen was seen for hypertension (46.60%) followed by musculoskeletal disorders(25.40%), hearing impairment(22.40%), visual impairment(20.80%) and Diabetes mellitus(12.72%). As far as the prevalence of risk factor was concerned, the prevalence of alcoholism(71.68%) and obesity(38.73%) was high in these population. The study also found the presence of high illiteracy rate, lack of proper social security, long duration of fishing activity, lack of proper protection from sunlight and noise on board in the fishermen population. Age was significantly associated with most of the morbidity in the present study. The lack of exercise and increased BMI was significantly associated with the prevalence of Diabetes mellitus and hypertension. Increased exposure to sunlight at work and increased exposure to noise on board were significantly associated visual and hearing impairment significantly.

Conclusions:

The study concluded that the prevalence of non communicable diseases in the fishermen population of Chennai coastal district was high, highlighting the need for specific screening programmes and occupational health services for these population.

Key words: physical morbidity, fishermen, health, prevalence, coastal population

1. INTRODUCTION

Fisheries are a vital food production sector in Tamil Nadu and have ensured the food security of large number of people. The fishermen are the most important part of the fishing activities. India is one of the main fish producing countries in the world and Tamil Nadu is one of the major states in India contributing to that achievement. The marine fish production of the state has been estimated to be 4.32 lakh tonnes for the year 2013- 2014, with an export value of rupees 3331.78 crore (2012-2013). The total number of fisher folk dependant on marine industry in Tamil Nadu was nearly 8.11 lakh (2012-2013).[1]

Fishing is a hazardous occupation.[2] The fishermen have a high prevalence of non communicable disease risk factors. The stressful and strenuous nature of the job makes the fishermen prone for many health related morbidity. Some of the commonest physical morbidity reported in the fishermen populations across the world are hypertension, musculoskeletal disorders, Diabetes Mellitus, visual impairment and hearing impairment.

Hypertension

Studies across the world have shown the prevalence of hypertension in fishermen from 4% to 45%. Kirkutis et al.[3] had shown the high blood pressure prevalence of 44.9% in fishermen of Lithuania. Mudgal et al.[4] had shown the hypertension prevalence of 4.4% in fishermen of coastal area of Mangalore, India. The probable reason for the high prevalence of hypertension in fishermen put forth are increase in body mass index, smoking, alcohol, lack of physical activity outside of work, high salt diet, poor education and low socioeconomic status.

Diabetes Mellitus

Diabetes is a common non-communicable disease in India. Ramachandran et al. had shown 10% prevalence of diabetes in fishermen population of South India. The proposed risk factor for the incidence of diabetes in the population are ageing, male gender, stress associated with prolonged days of fishing, poor nutrition, smoking, alcohol and increased body mass index. In spite of the high prevalence and a major cause of morbidity and mortality, diabetes remains highly unrecognised. WHO report 2008 stated diabetes as a major public health disease in coastal areas of western Pacific region.

Musculoskeletal disorders

Fishermen across the globe are prone for musculoskeletal problems especially low back pain. The physically demanding nature of the job, manual handling of heavy equipments and the improper ergonomic posture assumed during work, made the fishermen population develop increased musculoskeletal disorders. Many of the Swedish studies on fishermen have shown that musculoskeletal problems are common.

Visual impairment

Fishermen population are especially prone for visual impairment. Fishermen are prone to excess ultraviolet radiation due to constant exposure to sun.[5]

Marmamula et al.[6] reported the prevalence of visual impairment of 30% in the coastal areas of Andhra Pradesh. The most common reason stated in the study was due to refractive errors which are easily correctable.

Hearing impairment

According to WHO, hearing is the most common sensory deficit across the world and was the leading cause for Years lived with Disability (YLD). El-Saadawy et al.[7] has shown 37.90% prevalence of hearing impairment in fishermen community. Some of the Indian studies have shown a prevalence of 8% in South Indian fishermen population.

The epidemiological transition and the technological advancement in the fishing industry have led the fishermen prone for many of the non communicable diseases. Once considered as healthy, physically fit people have now shown increased incidence of non communicable diseases. The fishermen community are prone for a lot of morbidity and mortality due to their profession. Long Irregular working hours, rough sea, uncertainty of fish catch, poverty, poor education and ignorance of keeping good health, socioeconomic compulsion and behaviour problems of smoking and alcohol contributes to their morbidity and mortality.[8]

Because of their need to stay in sea for long days, ignorance of getting routine health check up and the health department unable to reach these vulnerable populations due to the nature of the fishing profession, hence most of the morbidity faced by fishermen go unnoticed.

In spite of the huge population involved in fishing activities and having given a sizeable contribution to India's GDP, the health and safety issues of these fishermen was never a concern. There are no occupational health services or mandatory health screening for these workers in India, which could provide data on the health related morbidity suffered by these populations. The nature of the occupation and lack of health insurance coverage made the diseases in the population go under reported. Hence a survey was needed to identify the magnitude of the health

problems suffered by the fishermen population and to suggest necessary steps for its prevention thereafter.

The recent data available through research in fishermen population showed gaps in both quantity and diversity of the studies done. There are limited number of studies in India, which had analysed the prevalence of morbidity and their associated risk factors in the fishermen population. Hence, this study was undertaken with the intention of finding the prevalence of physical morbidity that commonly occurred in the fishermen population and looking for the associated risk factors contributing to that morbidity.

Objectives of the Study

2. AIMS AND OBJECTIVES

i) To estimate the prevalence of physical morbidity in fishermen of Chennai district. 2014

ii) To estimate the prevalence of associated risk factors among the study population.

Justification

3. JUSTIFICATION

1. The prevalence of non communicable diseases in fishermen community has been on the rise over the past few years. WHO has declared these non communicable diseases as public health importance.

2. Nearly one in five individuals of the coastal population above the age of 20 years have been suffering with one or more chronic diseases.[9]

3. Most of the non communicable diseases in the population go unnoticed without an early screening and diagnosis.

4. There are several risk factors associated with chronic diseases that need to be identified and modified in order to reduce the prevalence of these diseases in the fishermen population.

5. There is dearth of systematic data on the various health morbidity patterns in the fishermen population in India. There is a need for up to date information regarding the prevalence of chronic diseases in order to set policies and priorities in the fishing community.

6. Very limited studies are available in India, particularly from Tamil Nadu, on the magnitude of the health related morbidity and their associated factors in the fishermen community that makes it necessary to carry out this study.

Review of Literature

4. REVIEW OF LITERATURE

4.1 DIABETES MELLITUS

Diabetes mellitus (DM) has reached epidemic proportions globally.[10] The World Health Organization (WHO) estimated that there were 135 million diabetic individuals in the year 1995 and it has been projected that this number will increase to 300 million by the year 2025.[11] WHO has projected that the maximum increase in the number of diabetics would occur in India. Considering the large population and increasing prevalence of diabetes mellitus of nearly 33 million diabetic subjects, the burden of diabetes in India could be enormous.[12] With a high genetic predisposition and high susceptibility to environmental insults, the Indian population faces a higher risk of diabetes and its associated complications.[13]

4.1.1 PREVALENCE OF DIABETES MELLITUS

Ramachandran et al.[14] 2006 studied about hyperglycemia in coastal area of Chennai. The studied included two groups of people, one affected by Tsunami and other being control group. The study reported that the prevalence of diabetes mellitus in both the groups of fishermen population was 10% and the impaired glucose tolerance prevalence was 9.8% and 8.3% respectively.

Jaremin et al.[15] 2005 had studied the prevalence and risk factors of diabetes in people who work at sea and found that the incidence of diabetes observed was close to the general population. The study reported that apart from genetic factors, environmental factors too played a significant role in the incidence of diabetes among such group.

4.1.2 RISK FACTORS ASSOCIATED WITH DIABETES MELLITUS

'Risk' is defined as a probability of an adverse health outcome, whereas 'risk factor' refers to an attribute or characteristic or exposure of an individual whose presence or absence raises the probability of an adverse outcome. [16].

Krynicki et al. suggested that high calorie diet, lack of proper regular physical activity outside of work, chronic stress, monotonus life at sea were some of the important reasons for the increased suspectibility of seamen to diabetes.

Cooper et al.[17] 2012 did the meta-analysis of the EPIC-Interact prospective case cohort study and concluded that specific groups of vegetables, principally green leafy vegetables and root vegetables, may be beneficial in preventing diabetes, while higher total fruits and vegetables intake is weakly inversely associated with type 2 diabetes mellitus.

Isao Muraki. Fumiaki Imamura et al. 2013 through their prospective longitudinal cohort study in health professionals reported that the associations with risk of type 2 diabetes differed significantly among individual fruits. Greater consumption of specific whole fruits, particularly blueberries, grapes, and apples, was significantly associated with a lower risk of type 2 diabetes, whereas greater consumption of fruit juice was associated with a higher risk. He concluded that the greater variety, but not quantity, of fruits consumed was associated with a lower risk of type 2 diabetes.[18]

Sofia Carlsson et al. in the study found that moderate alcohol consumption (5–29.9 g/day in men and 5–19.9 g/day in women) tended to be associated with a reduced incidence of type 2 diabetes compared with low consumption (<5 g/day). The estimates were lower in overweight (BMI ≥25.0 kg/m^2) subjects (relative risk

0.7, 95% CI 0.5–1.0 [men]. The study concluded that moderate alcohol consumption may reduce the risk of type II diabetes and high alcohol consumption may increase the risk of type II diabetes mellitus.

ICMR-WHO six site study in 2003 across four regions of the country on comprehensive NCD risk factors using WHO STEPS approach showed that the lowest prevalence of self-reported diabetes diagnosed by a physician was recorded in rural population (3.1%) followed by peri-urban/slum (3.2%) and the highest in urban areas (7.3%, odds ratio (OR) for urban areas: 2.48, 95% confidence interval (CI): 2.21–2.79, $p < 0.001$). The study showed that the trend of increased onset of diabetes (11.30%) was more seen in urban residents with abdominal obesity and sedentary activity.[19] The survey also pointed at the reversal of socioeconomic trends, with burden of disease increasingly seen among the poor.[20]

International Diabetic Federation strongly recommended the Finnish diabetic risk assessment questionnaire to measure the probability of an individual to develop type 2 DM in next 10 years. The Finnish diabetic association listed the risk factors which were associated with diabetes. It was found that age, weight, body mass index, exercise, fruits and vegetable consumption, hypertension and family history of diabetes mellitus had significant association with incidence of diabetes mellitus in the population.

Dariush Mozaffarian et al. 2009 stated through the study that there was an 82% lower incidence of diabetes (relative risk, 0.18; 95% confidence interval, 0.06-0.56) in participants who were in low risk group based on the physical activity level and dietary, smoking, and alcohol habits. He also reiterated that in the absence of central adiposity, incidence of diabetes was 89% lower (relative risk, 0.11; 95% confidence interval, 0.01-0.76).[21]

Rao C R et al. in the study on the association of risk factors to the presence of type 2 DM had found that positive family history and presence of obesity had a strong association with the prevalence of type 2 DM. Increasing age, history of current hypertension, and those having central obesity were also associated with a high risk of having diabetes. The results were found to be statistically significant.

Novak M et al. 2013 concluded in the study on the incidence of diabetes mellitus associated with stress, that men with permanent stress had a higher risk of diabetes [hazard ratio 1.52 (95% CI 1.26-1.82)] compared with men with no or periodic stress [hazard ratio 1.09 (95% CI 0.94-1.27)] independent of BMI and socioeconomic status.

4.2 HYPERTENSION

High blood pressure was a major risk factor for cardiovascular diseases. Hypertension was directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India.[22]

4.2.1 PREVALENCE OF HYPERTENSION

Shankarappa M Mudgal , Srinivas Kosgi et al. 2010 identified the prevalence of high blood pressure to be 4.4 % in the fishermen community of the island of Bengre, Mangalore . The study showed that the awareness among fishermen of their hypertensive state was as low as 40%. With most of the societies in the country and across the world were undergoing socioeconomic and epidemiological transition, hypertension was the commonest cardiovascular disorder considered to pose a major public health challenge. The study recommended that the awareness and proper control of high blood pressure should play a role in the dramatic reduction in morbidity and mortality attributable to hypertension. Despite the fact that hypertension was easy to detect by simple means, most of the hypertensive

population were unaware of their hypertension and had no treatment. In those who were being treated, blood pressure control was unsatisfactory in most cases. The factors affecting the prevalence of hypertension were many that included nationality and ethnic group, urbanization and industrialization, population migration, crowding and changes in life style including diet.[23]

Kirkutis et al. 2004 found that there was significantly high prevalence (44.9%) of elevated blood pressure among Lithuanian fishermen. The major risk factor identified in the study was a high cholesterol diet, increased body mass index (BMI), smoking, alcohol abuse, family situation and level of education.

4.2.2 RISK FACTORS ASSOCIATED WITH HYPERTENSION

4.2.2.1 INDIA

Gopi chand. M. et al. 2007 highlighted on the fishermen in urban slum of Visakhapatnam that with increase in BMI of the participant, the mean systolic and diastolic blood pressure of the group also increased. He concluded that the results of the current study provide support to the existing scientific evidence that suggest modernization, industrialization, and urbanization tends to .increase the cardiovascular risk factors such as obesity, and increase of obesity leads to disproportionate increase of other CVD risk factors like elevated blood pressure, lipids and cholesterol. He recommended in the study the need for different measures to be implemented in order to counteract the health problems. Gopi chand et al. recommended that the outcome of the study should guide the public health policy in developing appropriate intervention strategies to efficiently tackle these issues in fishermen life.[24]

Rama Walia et al. 2014 had studied the prevalence of cardiovascular risk factors in Asian Indians and demonstrated that sedentary lifestyle was the most prevalent risk factor in young age group. On the contrary, obesity and smoking was the most prevalent risk factors in middle and old age group.

Sengupta et al. 2011 studied the physical fitness of young fishermen of West Bengal demonstrated that there was significant difference in the blood pressure, fat distribution between fishermen and general population. This comparative study showed that the systolic and diastolic BP was higher in the fishermen population and the percentage of body fat was lesser. The difference in BMI was not statistically significant.[25]

4.2.2.2 WORLD

Norazmi Abdullah et al. 2006 had done a study on the fishermen of Kelantan, Malaysia on the coronary heart disease risk factors. The study showed that nearly three- fourth of the fishermen were poor and 1/3 rd of the total had no formal education. There was increased prevalence of smoking (76.5%). The prevalence of overweight was associated with income and had positive correlation with systolic and diastolic blood pressure. The prevalence of hypertension in the fishermen population in the study was 28.8%. The study highlighted increased smoking among fishermen; low HDL cholesterol and high prevalence of hypertension were the major risk factors in fishermen.

Begossi et al. 2013 in the study on high blood pressure among fishermen of coastal areas of south east Brazil found that 36% of the fishermen in the rural areas were hypertensives. The study observed that high salt intake by the population and sodium sensitivity of their body probably could be one of the important risk factor

for hypertension. The process of salting and drying fish increased salt intake of the people.[26]

Chobanian AV et al. in the report of the Joint National Committee on detection, prevention, evaluation and treatment of high blood pressure mentioned that hypertension was prevalent throughout the world, but it was potentially preventable. It was one of the major causes of disease and disability in the adult population all over the world.[27]

Heetveld et al. studied the prevalence of risk factor of heart and vascular diseases in fisherman from Urk, Netherland and found that there was an increased prevalence of high cholesterol, obesity, hypertension and smoking as the associated risk factor.[28]

The Lyon Diet Heart Study demonstrated that a ′Mediterranean diet′ (which was high in Fruits and Vegetables) substantially reduced the risk of incidence and mortality from myocardial infarction (MI) when compared with low fat diet alone.[29] A study carried out in South India too observed that higher fruits and vegetables intake gave 48% of protective effect against CVD risk factors in the studied population.[30] According to latest National Sample Survey Office (NSSO) survey revealed that out of 1000 household in India, vegetable consumption was seen more in the rural (983) than urban population (932). The consumption of fruits was even lesser with 608 (rural) and 777 (urban) residents only took them.[31]

Occupational noise exposure was associated with hypertension. Nawaz et al. in the study on the workers of Pakisthan showed that the workers exposed to high noise levels were more likely to be hypertensive (Odds ratio: 4.41, confidence interval: 2.123-9.196), and at risk for pre-hypertension (Odds ratio: 3,809;

confidence interval: 1.804-8.042) when compared with those working at normal sound levels.

Van kempen et al. in the meta-analysis on the association between noise exposure and blood pressure showed a significant association between occupational noise exposure and hypertension. The analysis of the study data concluded that noise exposure can contribute to the prevalence of cardiovascular disease.

4.3 VISUAL IMPAIRMENT

Visual impairment is a major public health problem both in India and Internationally. Without effective intervention, the number of blind people worldwide has been projected to increase.

4.3.1 PREVALENCE OF VISUAL IMPAIRMENT

According to WHO, the worldwide estimate of blindness was projected to be 76 million by 2020.[32] In India, it was estimated that there are approximately 6.8 million people who have vision less than 6/60 in at least one eye due to corneal diseases; of these, about a million have bilateral involvement.[33] It was expected that the number of individuals with unilateral corneal blindness in India will increase to 10.6 million by 2020.[34] According to census 2011, out of the 14.9 million males with disability, nearly 18% was due to visual impairment.[35]

Dandona et al. 2002 studied the prevalence of visual impairment in rural areas of Andhra Pradesh by stratified random systematic sampling method. The study also included the fishermen population The prevalence of visual impairment was found to be 8.09% and majority of them were caused by refractive error and cataract. The study found a significant correlation between visual loss and increasing

age, low socioeconomic status, rural residence. The study pointed at the high burden of preventable corneal blindness in the rural population of Andhra Pradesh.[36]

4.3.2 RISK FACTORS ASSOCIATED WITH VISUAL IMPAIRMENT

4.3.2.1 INDIA

Marmamula et al. 2011 had done a cross sectional study using cluster random sampling in the coastal region of Prakasam district, Andhra Pradesh. The fishing communities of the region were assessed for both near and far vision. Based on the definition of visual impairment as less than 6/18 in the better eye, the studied reported the prevalence of visual impairment in the fishing population as 30%. The study concluded that the prevalence of visual impairment in the fishermen population was very high and the majority of cases visual impairment due to refractive error could be easily corrected by spectacles.

Padmaja Kumari Rani et al. from the study on the prevalence of visual impairment on type II diabetic individuals reported that age, socioeconomic status, blood pressure was significantly associated with visual impairment. The odds of developing visual impairment were found to increase with age 60 years and above, low socioeconomic status and presence of hypertension. The study also pointed out that moderate alcohol users showed less prevalence of visual impairment.

Sarma CM et al. 1972 identified a unique type of keratopathy exclusively found in the fishing folk of Visakhapatnam engaged in deep sea fishing.. The keratopathy was named Fisherman's keratopathy, which was a variety of degeneration of the cornea. The study suggested that nature of the fishing occupation itself was a risk factor to develop visual impairment.

4.3.2.2 WORLD

Beaver Dam eye study, a long-term population-based cohort study from 1988 to 2013 concluded from their observation that physically active persons (people who engage in regular activity three or more times a week) showed 58 percent decrease in odds of developing visual impairment. It also showed that occasional drinkers of alcohol had a decrease risk of visual impairment. Heavy consumption of alcohol and smokers had an increased incidence of visual impairment.

Wong et al.[37] 1993 studied the relation between sunlight exposure and visual loss in fishermen of Hong Kong. The studied showed an increase proportion of fishermen exposed to sunlight developed cataract but the findings were not statistically significant. The probable reason suggested for this was lack of proper quantification of sun exposure, lens sensitivity and nutritional status of each participant.

4.4 HEARING IMPAIRMENT

Hearing loss resulted from pathologic conditions along the sound transduction pathway.[38] It is also defined as an increase in the threshold of hearing. The affected person is unable to understand speech in day-to-day life. Hearing loss can negatively affect work productivity, health-related quality of life, and cognitive and emotional status.[39] The prevalence of hearing loss was predicted to rise because of the aging population and exposure to loud noise.

According to Smith et al. 2011 hearing loss was one of the most prevalent chronic conditions in adults worldwide[40] and it is classified as conductive, sensorineural or mixed in type. Noise exposure was a well recognized and probably most studied environmental factor causing hearing loss

4.4.1 PREVALENCE OF HEARING IMPAIRMENT

Madhanraj et al. 2013 studied the prevalence and determinants of hearing impairment among population of coastal area of Villupuram district in Tamil Nadu by a multistage cluster sampling. The result of the study showed that 8.5% of the participants had hearing impairment and 7.1% of the participants had bilateral deafness.[41]

4.4.2 RISK FACTORS ASSOCIATED WITH HEARING IMPAIRMENT

4.4.2.1 INDIA

Madhanraj et al. 2013 highlighted that age and occupation were significantly associated with hearing loss (p=0.03 and p=0.01 respectively). The study also revealed that the odds of diabetes and ear trauma were high on person with diagnosis of hearing loss. The study concluded that there was high prevalence of hearing impairment in coastal areas of Tamil Nadu and the significant risk factor associated with it were age, diabetes and ear trauma.

4.4.2.2 WORLD

Axelsson et al.[42] 1986 stated that prolonged working days with inadequate rest in fishermen population exposed them to continuous high noise levels. The fishermen are exposed to engine noise even during sleep. Under unfavourable conditions at sea like vibration, sleep deficit and work at night, noise on board had a significant association to hearing impairment in these groups.

Betes et al. 2011 studied the hearing profile of the fishermen and found that majority of fishermen (96.8%) with hearing impairment were above the age of 40 years, about 80% of the fishermen felt the noise of the boat was intense and 17.31 %

of the participant self reported hearing difficulties. The study concluded that there was significant relation between age and auditory impairment.[43]

Itoh et al. 2001 had clearly shown that current smokers had increased odds of developing Sensory Neural Hearing Loss when compared with non smokers.[44] This difference in susceptibility was found to be statistically significant.

The presence of hypertension in an individual increased the propensity to develop hearing impairment with advancing age. Marchiori et al. 2006 analysed the association between hypertension and hearing loss in a case control study and documented that there was a significant association between hypertension and hearing loss. The number of hypertensive with hearing loss was more than the control group, even in the absence of smoking or alcohol. The study concluded that hypertension, age and male gender were independent risk factor for hearing loss.

Kaerlev L et al. in the study on Danish seafarers and fishermen highlighted that there was increased standardised hospital contact ratio (SHCR) for noise induced hearing loss among seafarers and fishermen. The relative risk of seafarers working in engine room of the ship was 2.39 (95% CI: 1.74-3.26). He concluded that hearing problems are frequent among men who work in the engine rooms on ships.[45]

Yuri Agarwal et al. had studied the hearing loss among US adults and reported that the prevalence of hearing loss was higher among participants with hypertension, diabetes mellitus, and heavy tobacco use (20 pack-years). He also reported that age and male sex was an important risk factor for the onset of hearing loss which was found to be statistically significant. He stated that the incidence of hearing loss occurs earlier in population with smoking, noise exposure, and

cardiovascular risks (at age 40-49 years). Using multiple logistic regress analysis he had proved that male sex, increasing age, less educated had significantly higher odds of hearing loss even after adjusting for noise exposure and cardiovascular risk.

Noise induced hearing loss was a significant occupational disease in many countries. Ageing affects many parts of the auditory system. Histopathological studies report that degeneration of the auditory system begins early in life and continues insidiously throughout life.[46] Epidemiological studies have supported a clear trend of an annual decline in hearing ability.[47] For many older people with historical noise exposure, the major sources of the hearing loss appear to be the effects of the noise exposure and ageing.[48]

Noise is an underestimated threat that can cause a number of short- and long-term health problems. It is increasingly becoming a potential hazard to health, physically and psychologically, and affects the general well-being of an individual.[49]

Noise-induced hearing loss was estimated among fishermen, automobile drivers, traffic police, road side hawkers, shop keepers, and garment workers in Bangladesh. More than two-thirds of the participants were unaware of their hearing impairment and 78% had poor knowledge about the adverse effects of noise on health.[50]

Age was a significant risk factor for hearing impairment that showed a positive correlation. Zhi-ling Zhang 2010 reported that age had a significant association with hearing loss. Wiley T L et al. had reported through their follow up study that advancing age led to the decline in the hearing ability. Burr et al.[51] 2005 through the cohort study on Danish workers concluded that age was associated with hearing loss.

4.5 MUSCULOSKELETAL DISORDERS

Musculoskeletal Disorders (MSD) are one of the major causes of morbidity, having a substantial influence on health and quality of life, imposing an enormous burden of cost on the healthcare system. These can broadly be categorized as joint diseases, spinal disorders and conditions resulting from trauma.[52]

4.5.1 PREVALENCE OF MUSCULOSKELETAL DISORDERS

Globally, musculoskeletal disorders is the largest single cause of work-related illness; accounting for over 33% of all newly reported occupational illnesses in the general population and 77% in construction workers.[5] The global prevalence of MSDs ranges from 14% to as high as 42%.

4.5.2 RISK FACTORS ASSOCIATED WITH MUSCULOSKELETAL DISORDERS

Elpida Frantzeskou et al. 2012 in the cross sectional study on the risk factor for fishermen's health and safety in Greece observed that the prevalence of occupation related injury was twenty-eight per cent, of which half of them caused more than one day absence, with 14% of the injury was due to near drowning. The prevalence of musculoskeletal problems and hearing impairment in the fishermen population was reported to be 71% and 16% respectively. The health risk factors studied include excessive weight, cardiovascular incidents and dermatological, musculoskeletal, respiratory, hearing, stress, and anxiety problems. The occupational health risk factors include alcohol, fatty food consumption, smoking, and lack of physical exercise. The study concluded that the health effects observed in fishermen were significantly associated with diet, smoking, and exercise outside of work. The results were comparable with international fisheries experience, mainly from Poland, Denmark, and Turkey.[53]

Helen Grimsmo-Powney et al. 2009 surveyed a convenience sample of fishermen at three major fishing ports in South West England using a standardized interview-administered questionnaire found 26% prevalence of injuries in the participants while at sea. She also reported that there was 7% prevalence of back pain and 8% prevalence of other musculoskeletal problems in the fishermen.

Kaerlev et al. found increased occurrence of MSD among fishermen in the United States of America, which was found to be statistically significant. In the study, he showed an increased standardised incidence ratio for arthrosis of the knee, thoraco-lumbar disc disorders, shoulder diseases, and carpal tunnel syndrome. The prevalence of musculoskeletal symptoms causing work disruption in the past 12 months was reported by 38.5% of the surveyed people, with low back symptoms accounting for 17.7%, followed by pain in the hands or wrists and shoulders, each location accounting for 7% of the cases.[54]

Heavy lifting and awkward working positions as well as obesity and joint injury may be considered the risk factors for disc degeneration, and also for arthrosis of the knee and hip.[55]

Kucera et al. 2010 studied the ergonomic risk factors for low back pain in fishermen of North Carolina. The study concluded from its findings that fishing occupation was associated with heavy lifting of weights. The study concluded that musculoskeletal problem was a common problem in fishermen population and it was associated with previous history of low back pain, additional workers on board, duration of work at sea.

A similar study done by Kristen L. Kucera et 2010 on the occupational stressors in small scale fishermen of North Carolina, highlighted that tough weather,

rough sea, unloading without mechanical assistance and long working days are the most strenuous activity.

Mahmoud El-Saied El-Saadawy et al. 2011 stated that fisherman's nature of work was too stressful. The work environment was uncomfortable in most cases, due to the length of work periods at sea as well as isolation for long periods of time away from the external environment. The factors considered to affect adverse health outcomes were exposure to loud machinery noise in the engine room which was common on board fishing vessels, exposure to changes in environmental conditions especially extremes of temperature and humidity. The risk of skin and eye damage due to sun exposure is greater at sea than on land because of the unhindered reflection of the sunlight. The results of the study showed more than 91% of fishermen had musculoskeletal complaints during the last 12 month compared to 38.50% in the control group. Also two third of the fishermen suffered from severe stress compared to 8.50% in controls. Of the total percentage of the fishermen exposed to accidents during their work, 73.40% of them reported injuries during these accidents, compared to lower percent among their controls. The study also showed that 37.90% of fishermen suffered from auditory complaints compared to 15.40% in the control group. The study concluded that the fishermen in the Alexandria city are exposed to many hazards that lead to many diseases including musculoskeletal problems and problems with the auditory system. It showed that most of the fishermen are suffering from high stress, sunburn, and the risk of accidents and injuries. The risk factors associated with these findings were spending long work hours in the sea, especially on small boats and instability on the same boat and non-use of personal protection equipments.[56]

Percin F, Akyol O et al. 2009 in the research on the occupational health of Turkish Aegean small scale fishermen found that the most prevalent health problems in small-scale fishermen were musculoskeletal problems, rheumatism and eye, ear and nose problems.[57] Humidity, cold weather and rough sea conditions combined with lack of appropriate protective clothing may be some of the risk factors. The respiratory problems were aggravated by exposure to exhaust gases and so does engine noises and sunlight that lead to ear, eye and skin problems during longer trips.[58] The results of their study also showed that twenty-nine per cent of fishermen did not have any social security cover. Nearly 85% of fishermen reported eye problems due to light reflection of the sea surface; but only 34% declared the use of sunglasses. Nearly half of the fishermen reported occupational injuries on board with two third of them had minor injuries.

4.6 BEHAVIOURAL AND OCCUPATIONAL RISK FACTORS IN FISHERMEN

Amit Bhondve et al.[59] 2011 concluded through the descriptive study on the assessment of addiction among fishermen in the coastal area of Mumbai that majority (81.60%) of fishermen had some kind of addictions. The prevalence of alcohol and tobacco consumption was seen in 63.4% and 73.4% of the fishermen respectively. He concluded from the study that there was an increase prevalence of smoking and alcohol consumption in fishermen and this behaviour was primarily influenced by the type of occupation they are doing and the amount of job stress.

Casson et al. in the study on the Italian fishermen identified that there was significant association seen between fishing job and ill health. They found that the fishermen had a higher prevalence of occupational injuries (OR=3.56) and chronic bronchitis (OR=11.6). There was significant correlation between work injury and musculoskeletal dysfunction.[60]

Gander et al. 2008 in the study on rotating schedules of the fishermen of New Zealand, pointed that the irregular schedules involved in fishing occupation led to acute sleep loss and performance impairment, subsequently leading on to occupational injuries. The study found that fishermen had split sleep at sea (Wilcoxon signed ranks $p<0.001$) and obtained less than 4 hours of sleep. There was acute sleep loss and residual sleepiness after sleep more common at sea than at home. The more the duration of fishing trips, more the cumulative sleep loss seen in the fishermen.

Gates et al. 2013 showed that about 15-25 dB attenuation in noise level could be achieved by simple measures like inserting ear plugs while at work and thus help people to work in hazardous areas.[61]

Hansen et al. 2011 in the study of the prevalence of overweight among the Danish fishermen highlighted that overweight was a major threat to the health of the fishermen. The relative risk for fishermen of being overweight was 1.45 (1.25-1.66). The probable reason for overweight in fishermen stated was the abundance of food available and the sedentary nature of fishing activity lately due to the technical advancement, needing less calorie breakdown in the fishermen.

Janella Mariam Jacob et al. 2013, from the study on the Indian fishermen concluded that longer the working hours in sea, the greater was the problem with their work and their health .The results of the study revealed that there was nearly 60% prevalence of moderate stress and about 35% prevalence of severe stress among Indian fishermen.[62]

Novalbos et al. found that excessive consumption of sweets and snacks on the boat, high fat containing foods in diet, excess alcohol consumption when in

shore, smoking and lack of exercise outside of work, were the major risk factor for health morbidity in fishermen. The work in Greece fishermen showed that irregular working hour pattern and the nature of work resulted in physical and psychological overload that led to these unhealthy habits.

Rajan R Patil, 2011 highlighted that young fishermen in particular are at high risk for occupational injuries, which could be prevented by adequate job training, effective follow up and reduced demands for efficiency from beginners. He also stressed the importance of general health insurance apart from life insurance for the fisheries workers as they were also prone for major illness, surgeries and hospitalisation.

Salyga, 2004 stated that seamen were special group of people because they spend most part of their lives in sea. The feeling of long term isolation from their families and society arise due to their nature of work. The majority of seamen lived and worked in conditions that are extremely harmful to their health. The factors that affected their health most were: vibration, noise, electromagnetic field, long term stress, the changes in time and climatic zones, irregular sexual intercourse, etc. These risk factors had a negative influence on their health condition and their lives.

Sandhya G I et al. 2013 in the study done on the fishing population of coastal region of Thiruvananthapuram, Kerala had reported an increase in the number of morbidities among fishermen. The morbidities found in increased frequency were hypertension and diabetes. The study concluded that age was a significant risk factor for the onset of chronic morbidities.

Materials and Methods

5. METHODS AND MATERIALS

5.1 STUDY DESIGN

The study design was a cross sectional study done in Chennai coastal district between June 2014 and August 2014 to estimate the prevalence of physical morbidity in fishermen and their associated risk factors. The study population were all fishermen above 18 years in Chennai district who venture in to the sea to catch fish for their livelihood.

5.2 STUDY PLACE

The community based cross sectional study was conducted at the coastal areas of north Chennai district.

5.3 STUDY DURATION

The study was carried out from November 2013 to September 2014. The period of field study was from June 2014 to August 2014.

5.4 STUDY POPULATION

The study population consisted of only male participants aged above 18 years in the Chennai coastal district. This population was chosen because the study wanted to concentrate exclusively on fishermen who venture into the sea. These were the people in the whole of fishermen population who had the highest chance of exposure to risk factor that led to the physical morbidity in that population.

The total fishermen population above 18 years in whole of Chennai district was 24326. The total fishermen population above 18 years in north Chennai district was 15959.

Inclusion criteria

Fishermen of above 18 yrs of age were included in this study with their consent.

Exclusion criteria

1. Those fishermen who had not given consent to participate in the study were excluded.
2. Fishermen group who stay onshore and don't venture inside the sea to catch fish were excluded.
3. Those fishermen who were not available on the day of the administration of the questionnaire.

5.5 SAMPLE SIZE

The sample size was calculated based on a study done by Shankarappa M Mudgal, Srinivas Kosgi et al. on the prevalence of hypertension among fisherman community in the Island of Bengre, Mangalore. The prevalence of hypertension among men was found to be 4.4% in their study. Considering prevalence as 4.4%,

At 95% C.I., Z alpha = 1.96 and

p= 4.4%, q= 95.6%

Margin of error= 2.5%

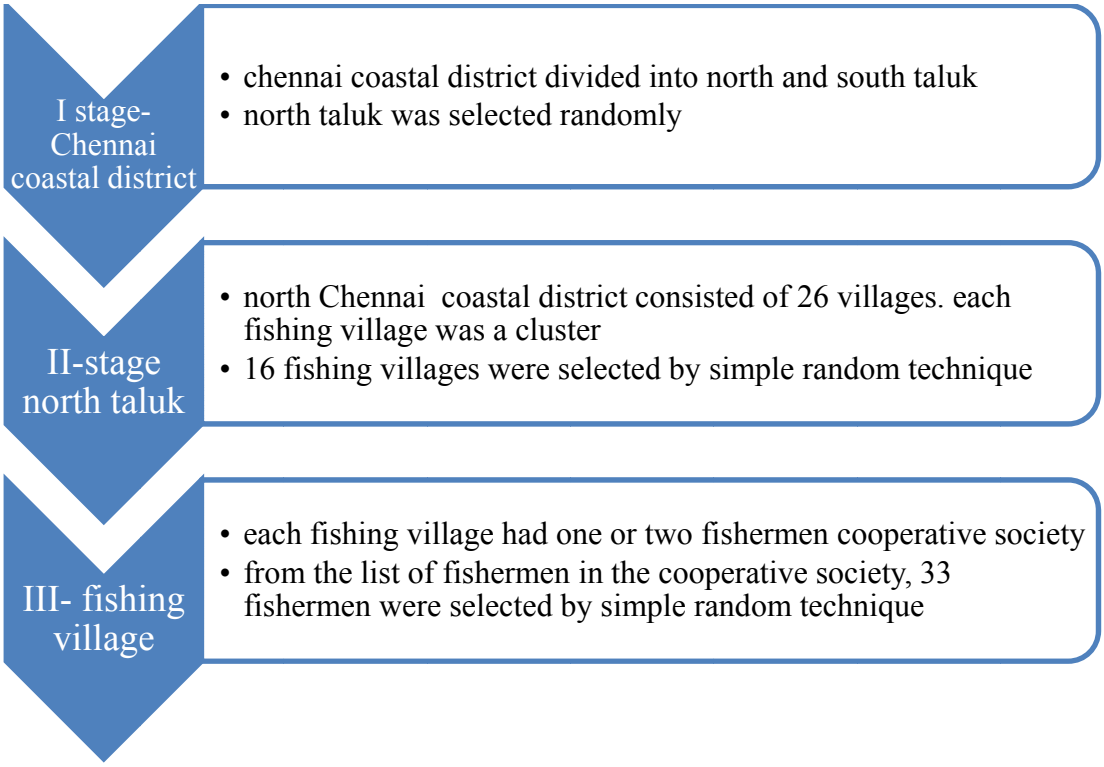
Design effect = 2

$$\text{Sample size} = \frac{1.96 \times 1.96 \times 4.4 \times 95.6 \times 2}{2.5 \times 2.5} = 518$$

Although the final sample size was calculated to be 518, data were collected from 519 sample fishermen so as to achieve the objectives.

5.6 SAMPLING METHOD

The state of Tamil Nadu has a total of 13 coastal districts. This study was conducted in Chennai coastal district.



The sampling method used was multistage cluster sampling method. Chennai coastal district was divided into north and south taluk comprising of 42 fishing villages in all. In the first stage, the north taluk of Chennai coastal district was selected at random which consisted of 26 fishing villages. In the second stage, out of the 26 fishing village, 16 fishing village (>50%) were selected at random. Each fishing village was considered as a cluster. Each fishing village consisted of Government registered fishermen cooperative society which was headed by a president. All the fishermen who venture into the sea were members of the respective cooperative society. The list of fishermen of each cooperative society was obtained from the president. In the third stage, from the list of fishermen from the register, 33 fishermen who venture into the sea were selected by simple random

technique using computer generated simple random numbers and were included in the study.

In case of the non availability of the individuals selected by simple random technique, the next person on the list was included to be part of the study.

5.7 STUDY INSTRUMENTS

- A semi structured questionnaire,
- standard weighing scale,
- non stretchable inch tape,
- sphygmomanometer,
- Snellen chart with numbers,
- 512 Hz tuning fork,
- blood collection test tube were used.

5.7.1 QUESTIONNAIRE

A semi structured questionnaire was prepared relevant to the study. It was tested by pilot study on 20 patients. Based on the observations of the pilot study, appropriate changes were made and the questionnaire was finalised. The questionnaire was prepared in two languages, English and Tamil. The questionnaire consisted of three parts

1. The socio demographic details of the individuals and their family
2. The history of physical morbidity in the past.
3. The history regarding the modifiable risk factors- i) family history of diabetes or hypertension ii) diet patterns iii) physical activity patterns iv) occupational related exposure to risk factors v) history of addiction.

5.7.2 MEASUREMENTS

Following the administration of the questionnaire, measurements for height, weight, waist circumference, blood pressure, visual acuity measurement, tuning fork test for hearing, blood for PPBS levels were taken from the participants of the study.

5.7.3 MEASUREMENT OF WEIGHT

The weight was measured with help of a standard electronic weighing machine validated every day before the start of each session with a person of known weight. Weight was recorded using a calibrated weighing scale (Salter weighing scale), that was kept on a firm horizontal surface. Weight was measured in the upright position without footwear to the nearest 500 gm.

5.7.4 MEASUREMENT OF HEIGHT

The height was recorded using a measuring tape to the nearest 0.5 cm. Subjects were requested to stand upright without footwear with their back against the wall, heels together and looking forward

5.7.5 MEASUREMENT OF WAIST CIRCUMFERENCE

Waist circumference was measured to the nearest 0.1 cm at the mid-point between the costal margin and iliac crest using a non-stretchable measuring tape, at the end of normal expiration with the subject standing erect in a relaxed position, feet 25 – 30 cm apart maintaining appropriate privacy.

5.7.6 MEASUREMENT OF BLOOD PRESSURE

Blood pressure was measured on the right arm in a sitting posture, with the subject in a relaxed state. Standardized mercury sphygmomanometer (Diamond deluxe BP apparatus, Pune, India) with adult size cuff was used. The first appearance of sound (phase 1 of Korotkoff sounds) was used to define Systolic Blood Pressure (SBP). The disappearance of sound (phase 5) was used to define

Diastolic Blood Pressure (DBP). Two readings were taken five minutes apart and the average of the two readings was taken as the final reading. .

5.7.7 ASSESSMENT OF VISUAL ACUITY

The visual acuity of the participant was tested using the Snellen chart. The participant was made to sit at a distance of 6 meter (20 feet) from the Snellen chart. Each eye was tested separately by the examiner ensuring good natural light. The participant was asked to read the number as seen by him in the chart. The visual acuity was determined by the smallest number the participant could recognise clearly on the chart. The visual acuity of the participant was written in the form a fraction, where the numerator indicated the distance from which the participant could read the line clearly and the denominator denoted the distance from which a normal person with good vision could read the same line clearly.

5.7.8 ASSESSMENT OF HEARING

The hearing test of the participant was tested using the help of 512 Hz tuning fork. The participant was made to sit in a quiet room and each ear was tested separately with the help of tuning fork. Rinne and Weber test was applied in every individual after explaining the procedure and their ability to perceive the sound was asked for. The individuals who were unable to perceive the sound were then compared with the examiner’s ear.

Rinne test was performed by placing a high frequency (512 Hz) vibrating tuning fork against the patient's mastoid bone and asking the participant to tell when the sound was no longer heard. Once the sound was not heard, quickly the vibrating tuning fork is held 1–2 cm from the auditory canal, and again asked to tell if they are able to hear the tuning fork.

Weber test was performed by placing the base of the vibrating tuning fork 512 Hz over the middle of the participant's forehead and asked in which ear the sound was heard better.

5.7.9 ASSESSMENT OF MUSCULOSKELETAL DISORDER

The musculoskeletal problem in the participant was assessed by looking for swelling of the major and minor joints. Next the participant was asked to do active muscle movements of the back by flexion of the hip joint with extension of the knee joint to touch his toes with his hands. The participants who complained of back pain or back muscle tightness were noted.

5.7.10 MEASUREMENT OF POST-PRANDIAL BLOOD SUGAR

About 2 ml of venous blood sample was collected from the participant under aseptic condition after explaining the detailed procedure to them. The participants were informed in advance to have their food 2 hours before the procedure in order to obtain the 2 hours postprandial blood sugar result. The blood samples were transferred from the place of collection to the laboratory in insulated containers packed with ice bags and was processed within 4-6 hours. The participants who were found positive for high blood sugar were informed about the result and were requested to attend the nearest government or private hospital. The results of the blood sugar test done in the hospitals were cross checked over phone with the participants and found to be matching.

5.8 DATA COLLECTION AND METHODS

Data collection was done in the study area after obtaining permission from The Director, Institute of Community Medicine, the Dean, Madras Medical College and approval from the Institute Ethics Committee. Written permission was obtained

from the President, Chennai District Fishermen Cooperative Federation for conducting the study.

Prior to the collection of data, the investigator took guidance from the ophthalmologist, ENT and orthopaedics specialist of the Rajiv Gandhi Government General hospital, Chennai in order to refine the knowledge and skill on the procedure of visual acuity assessment, Tuning fork test and musculoskeletal examination respectively.

After selecting the cluster and identifying the fishermen in the list after simple random sampling, the fishermen were contacted with the help of the president of the respective cooperative society. The fishermen were interviewed and examined in the community hall and office area of the respective cooperative society. Informed consent forms both for the questionnaire and blood examination were signed in by the participants on the day the questionnaire were administered. After a brief introduction and obtaining the informed consent forms filled by the participants, relevant information was obtained from the respondent using the semi structured questionnaire in the local language.

On completion of the data collection, fishermen were given health education on the risk factors associated with the physical morbidity after making them assemble as groups and conducting a interactive session with them.

5.9 ANALYSIS PLAN

Data was entered into MS Excel and analysis was done using SPSS 16 software. The prevalence of the physical morbidity among fishermen and the estimate of associated risk factors and its 95% C.I. was derived. The results are expressed as percentages and proportions. A logistic regression analysis to calculate

adjusted PORs and 95% C.I. was done. A Chi-square test was used to assess the trends in the prevalence of health morbidity among different age groups of study population and the association of the prevalence of surveyed health morbidity and the different correlates. To study the impact of the selected socio-demographic factors, anthropometric measurements (BMI) and other risk factors, on the prevalence of the condition, logistic regression analysis was performed, with health morbidity as a dichotomous outcome, and age, education, working conditions, socioeconomic status, physical activity, positive family history of diabetes and hypertension, BMI, central obesity (WC), exposure to sun and noise, occupational injury as independent variables. All statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 16. A P-value < 0.05 was considered statistically significant.

5.10 OPERATIONAL DEFINITIONS

5.10.1 DIABETES MELLITUS

The diagnosis of Diabetes Mellitus was based on a self-reported physician diagnosis, the use of antihyperglycemic medication, or the WHO criteria on the 2hr postprandial blood glucose level of 200mg/dl or more of the venous blood.[63]

5.10.2 HYPERTENSION

A person was considered to be a hypertensive if he had a self reported physician diagnosis, the use of antihypertensive medication, or with a current Systolic blood pressure of > 140 mm Hg or Diastolic blood pressure > 90 mm Hg.[64]

5.10.3 VISUAL IMPAIRMENT

The diagnosis of visual impairment was made from the classification of visual impairment and blindness adapted from international statistical classification

of diseases and related health problems, tenth revision, World Health Organisation, 1992. The visual acuity of 6/6 to 6/18 was considered as normal vision and the visual acuity of less than 6/18 was considered as a case of visual impairment. The visual impairment in this study was defined as "A person having a visual acuity of less than 6/18, in at least one of the eye."

5.10.4 HEARING IMPAIRMENT

The diagnosis of hearing impairment was made by applying Rinne and Weber test. Rinne negative or Weber lateralisation to one side in an individual was considered to have hearing impairment. The operational definition used for pronouncing a person as hearing impaired was 'Any person having either conductive deafness or sensorineural hearing loss at least in one ear.'

5.10.5 MUSCULOSKELETAL DISORDER

The case definition for musculoskeletal disorder was based on the presence of swelling of any major or minor joints and/or by the presence of pain or muscle tightness of the back on doing active movements.

The history of musculoskeletal complaints was entertained if the participant had one of the symptoms of pain or stiffness of the back or swelling of any of the joints in the past year that lasted at least a week or more.

5.10.6 SOCIO ECONOMIC STATUS

The modified Kuppuswamy scale has been used to classify the socio economic status of the population (Annexure IV).[65] The socio-economic status (SES) scale as described by Kuppuswamy which takes into account the education of the head of the family, occupation of the head of the family, and monthly income of the family was followed.[66]

5.10.7 BODY MASS INDEX

Body mass index (BMI) was calculated using the Quetlet formula, weight (kg) / height (m^2). Based on the criteria modified for Asian Indians, a person was considered to be obese if body mass index (BMI) $\geq$ 25 kg/m^2 and overweight when BMI $\geq$ 23 kg/m^2. [67]

Central / abdominal obesity was considered to be present when the waist circumference measured ≥90 cm in males. High waist circumference was defined based on criteria modified for Asian Indians (WC ≥90 cm in men).[67]

5.10.8 FAMILY HISTORY

Individuals with either a parent or a sibling (brother or sister) having diabetes or hypertension, were considered to have a positive family history.

5.10.9 CURRENT SMOKER

Current smoker was defined as a person who continued to smoke at the time of survey daily or occasionally.[68]

5.10.10 CURRENT ALCOHOLIC

Current alcohol user was defined as a person who has consumed alcohol in the past 12 months.[68]

5.10.11 DEFINITION OF AWARENESS OF HEALTH AILMENT

Awareness of health ailment was defined as the subject reporting a prior diagnosis of such ailment, for example high blood pressure, made by health personnel.

Results and Analysis

6. RESULTS

The present study was conducted among 519 fishermen belonging to the coastal areas of Chennai, which represented 1.65% of the total fishermen population of the entire Chennai coastal district. The results obtained in the study are presented below.

6.1 SOCIODEMOGRAPHIC PROFILE OF THE PARTICIPANTS

Figure 1

Age wise distribution of the study population (N=519)

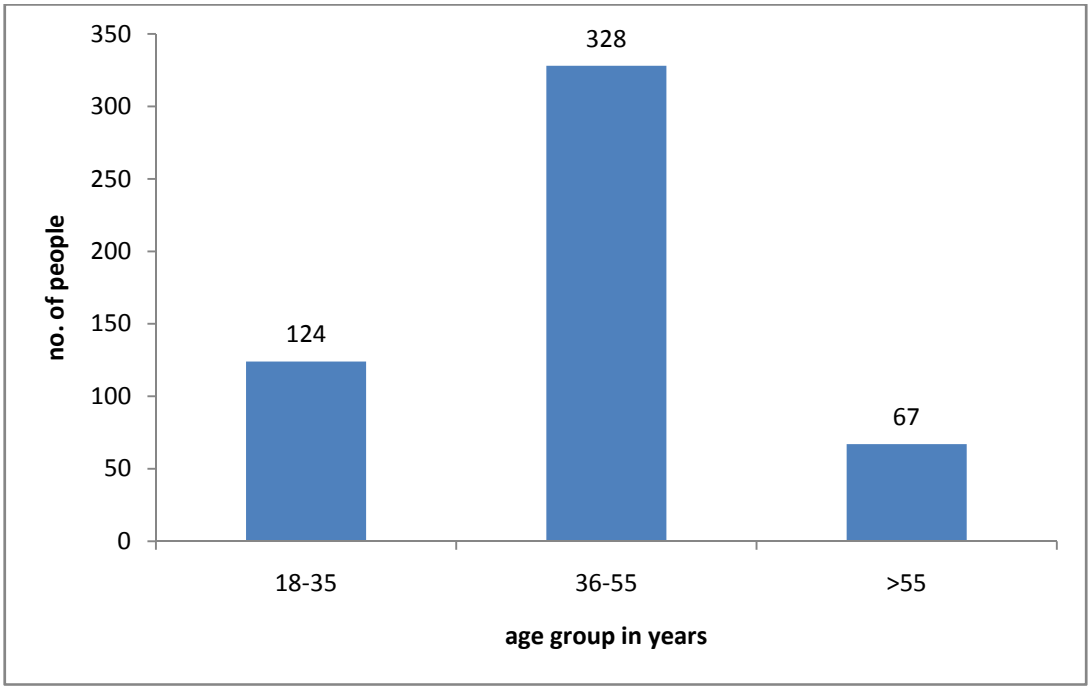


Table 1 given below shows the mean age of the fishermen population was 44±10 years, with 2/3 rd of them belonging to the middle age group. The age of the studied subject ranged from 19 years to 70 years. Most (92.50%) of them were married. Nearly one third of the study population had no formal education. Out of the total, one third of them were living in rented houses. According to modified Kuppuswamy's socioeconomic status scale, 79% of the population belonged to upper lower socioeconomic status. Unfortunately 78.60% of the fishermen had no social

security cover of their own. Only 10 percent of the population had their own boat to go for fishing. Rest of them had to depend on other boat owners to make their living.

Table 1

Socio-demographic details of the fishermen (N=519)

Parameters	Frequency	Percentage
Age in years		
18-35	124	23.89
36-55	328	63.21
>55	67	12.90
Education		
Illiterate	160	30.83
Literate	359	69.17
Marital status		
Married	480	92.48
Unmarried	39	7.52
Socioeconomic status		
Upper middle	16	3.08
Lower middle	93	17.92
Upper lower	410	79.00
Social security		
Yes	111	21.40
No	408	78.60
Owning house		
Yes	317	61.10
No	202	38.90
Boat ownership		
Own	49	9.44
Others	470	90.56

Figure 2

Distribution of fishermen based on type of boat used (N=519)

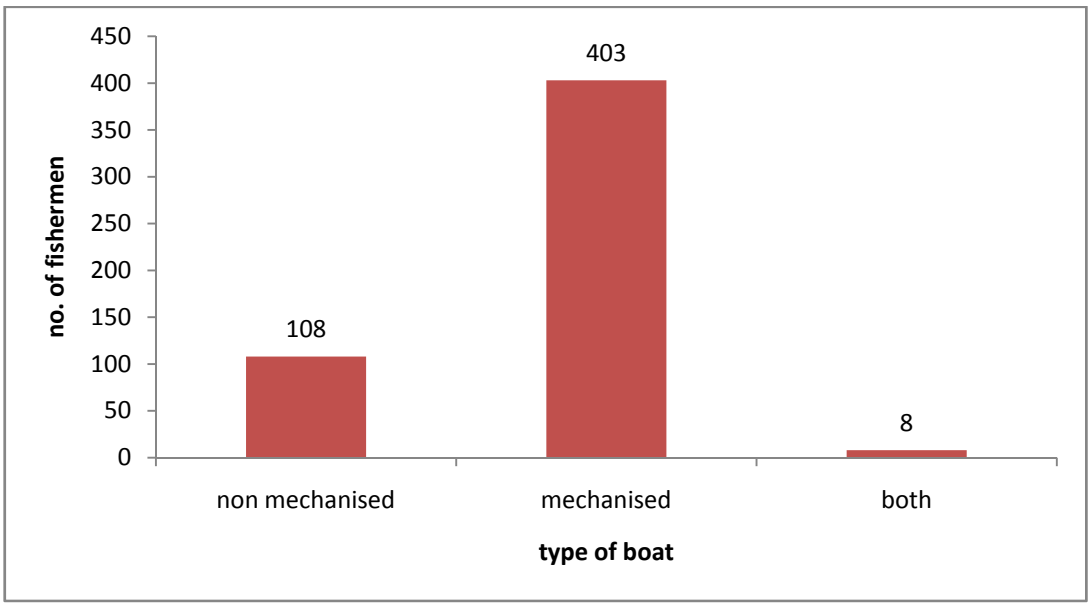


Table 2

Distribution of fishermen based on personal habits

Parameters	Frequency	Percentage
Current tobacco smoking (N=519)	**No.**	**(%)**
Present	179	34.30
Absent	340	65.70
Duration of tobacco smoking in years (N=179)		
1-10	75	41.57
>10	104	58.43
Current alcohol consumption (N=519)		
Present	372	71.68
Absent	147	28.32
Duration of alcohol consumption in years (N=372)		
1-10	156	41.94
>10	216	58.06

Table 2 shows the addiction behaviour of the fishermen. The number of fishermen currently smoking tobacco was 179 (34.30%), out of which nearly 60% had the habit for more than 10 years. Three fourth of the participants currently had the

habit of consuming alcohol, out of which nearly 60% had the history of use for more than 10 years.

Table 3

Distribution of fishermen among different occupational characteristics (N=519)

Parameters	Frequency	Percentage
Type of boat		
Unmechanised	108	20.81
Mechanised	403	77.65
Both	8	1.54
Years of fishing		
1-10	80	15.41
11-20	160	30.83
>20	279	53.76
Workings days in sea per month		
< 1 week	78	15.03
1-2 week	77	14.84
2-3 week	214	41.23
3-4 week	150	28.90
Fishing trips		
Daily	211	40.70
2- 5 days	106	20.40
6- 10 days	172	33.10
11- 15 days	30	5.80
Alternate job		
Yes	57	10.98
No	462	89.02
PPE for sun exposure at work		
Yes	60	11.60
No	459	88.40
PPE for noise		
Yes	21	4.00
No	498	96.00

Table 3 presents the occupational characteristic of the fishermen. It showed that 77.65% of the total fishermen used mechanised boat and 20.81 per cent used non engine boat to go into the sea for work. The average working experience of the surveyed fishermen was 24± 11.5 years. More than ten years of fishing experience was present in 84.60 % of the individuals. On a monthly average, the percentage of population working in sea for more than 2 weeks and 3 weeks was 41.23 and 21.90 respectively. About 40 per cent of the participants made daily fishing trips to sea and the rest of the population stayed in sea ranging between 2 to 15 days per fishing trip. The table also showed that 11% of the fishermen were involved in alternate jobs for living other than fishing. Regarding the prevalence of personal protective equipments against sunlight during work, it was seen that only 11.60% of the population used any form of PPE. With regard to PPE use against noise is concerned, only 4% of them used any of it.

Figure 3

Distribution of population based on days of return from sea

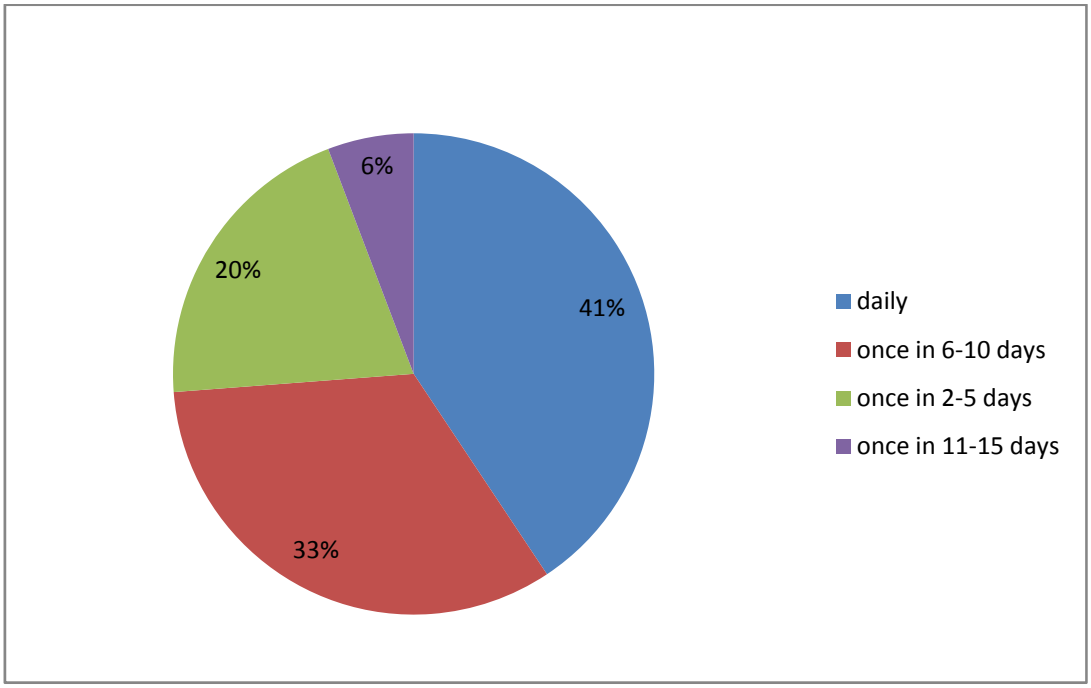


Table 4 shows the food eating practise of the fishermen. It was seen from the above table that only one third of the population consumed fruits on a daily basis, one-third consumed on a weekly basis and 14.06% never consume fruits. With regard to vegetable intake, only 23.7% individual's consumed vegetables on a daily basis, one-fifth consumed on a weekly basis and 5% of the population never consumed vegetables. As far as fish uptake is concerned, nearly one fifth of the sample population consumed fried fish daily and 2.70% consumed salted dried fish on a daily basis.

Figure 4

Distribution of fishermen based on frequency of intake of food (N=519)

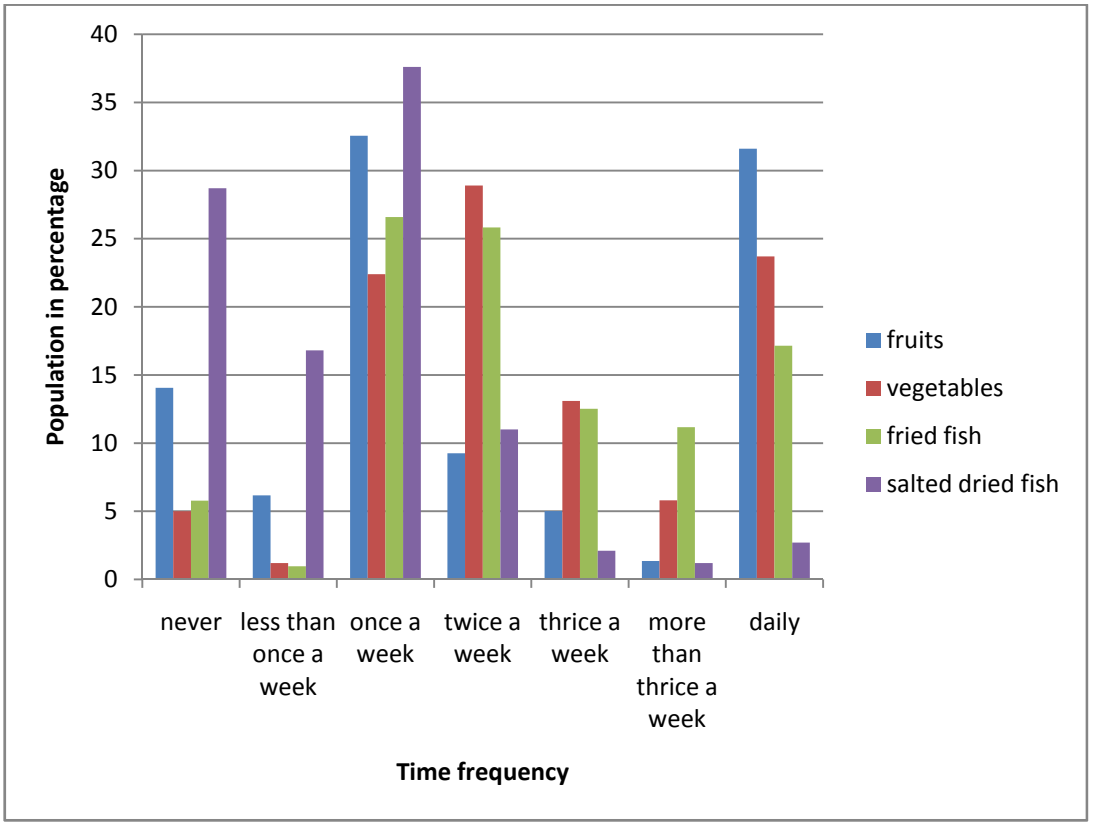


Table 4

Distribution of fishermen based on food habits (N=519)

Parameters	Frequency	Percentage
Fruits consumption		
Never	73	14.06
Less than once a week	32	6.16
Once a week	169	32.56
Twice a week	48	9.26
Thrice a week	26	5.01
More than thrice a week	7	1.35
Daily	164	31.60
Vegetable consumption		
Never	26	5.0
Less than once a week	6	1.2
Once a week	116	22.3
Twice a week	150	28.9
Thrice a week	68	13.1
More than three times a week	30	5.8
Daily	123	23.7
Fried fish consumption		
Never	30	5.78
Less than once a week	5	0.97
Once a week	138	26.59
Twice a week	134	25.82
Thrice a week	65	12.52
More than thrice a week	58	11.17
Daily	89	17.15
Salted dried fish		
Never	149	28.70
Less than once a week	87	16.80
Once a week	195	37.50
Twice a week	57	11.00
Thrice a week	11	2.10
More than three times a week	6	1.20
Daily	14	2.70

Figure 5

Self awareness of Diabetes Mellitus and hypertension among fishermen

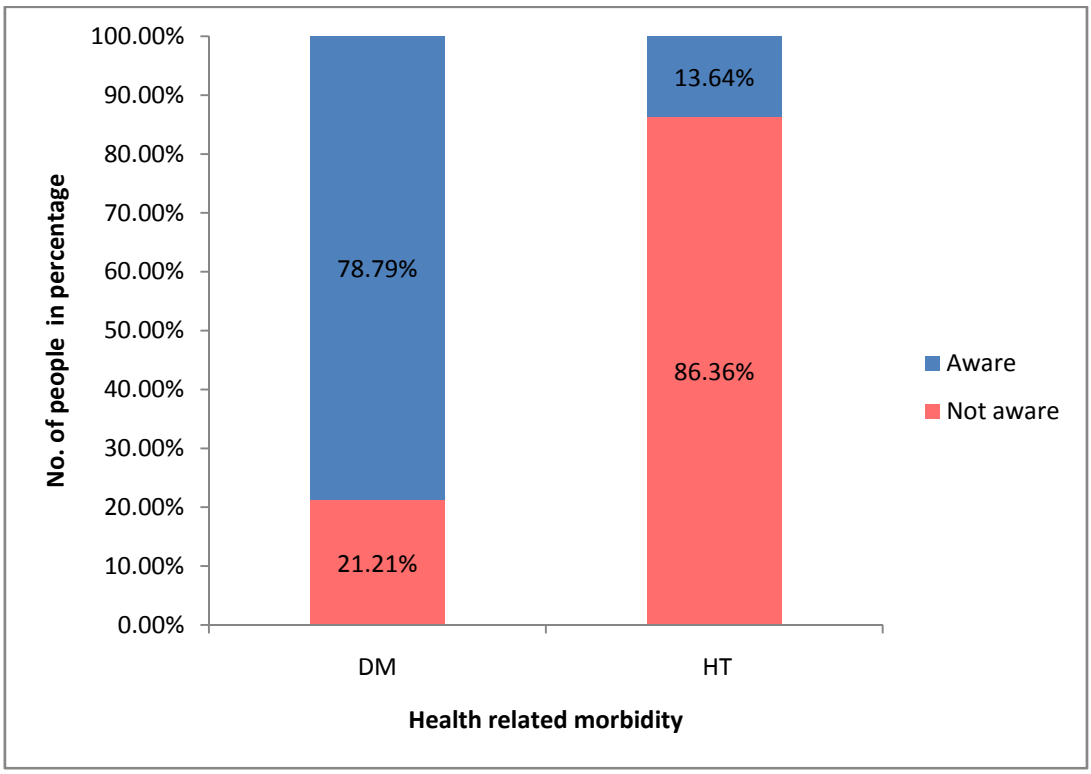


Table 5 given below represents the health awareness of the individuals. Ten per cent of the fishermen population gave positive history for diabetes mellitus in them. Ten per cent of the population knew they had hypertension. Nearly 4% of the participants suffered with chronic bronchitis. Approximately one in two individuals gave history of visual loss and close to one in eight individuals gave history of hearing difficulty. The number of fishermen that had injuries while at work in the last one year was 127 which were close to one fourth of the sample population.

Table 5

Distribution of fishermen based on subjective awareness of disease (N=519)

Parameters	Frequency	Percentage
Known about Diabetic status		
Yes	52	10.00
No	467	90.00
Known about hypertension status		
Yes	52	10.00
No	467	90.00
History of Chronic bronchitis		
Yes	19	3.70
No	500	96.30
History of Visual problems		
Yes	266	51.30
No	253	48.70
History of Hearing problems		
Yes	69	13.30
No	450	86.70
History of Musculoskeletal problems		
Yes	290	55.90
No	229	44.10
History of Occupational injury		
Yes	127	24.50
No	392	75.50

Table 6 given below presents the risk factors of family history and obesity in fishermen. One- fifth of the sample population had a family history of Diabetes and one-tenth of the population had family history of hypertension. Nearly 86% of the interviewed people informed that they did not exercise outside of work. The body mass index calculated showed 15.99 per cent and 38.73 per cent of the individuals to be overweight and obese respectively. The central obesity indicated by abnormal waist circumference was observed in 42.77 per cent of the study group.

Table 6

Distribution of fishermen based on family history, fat distribution and physical activity (N=519)

Parameters	Frequency	Percentage
Family history of diabetes		
Yes	107	20.60
No	412	79.40
Family history of hypertension		
Yes	42	8.10
No	477	91.90
Exercise		
Yes	75	14.45
No	444	85.55
BMI (kg/m^2)		
Normal	235	45.28
Overweight	83	15.99
Obesity	201	38.73
Waist circumference		
Normal(<90cm)	297	57.22
Abnormal(≥90cm)	222	42.77

6.2 MEASUREMENTS OF PHYSICAL PARAMETERS

Figure 6
Mean value of physical parameters measured in fishermen

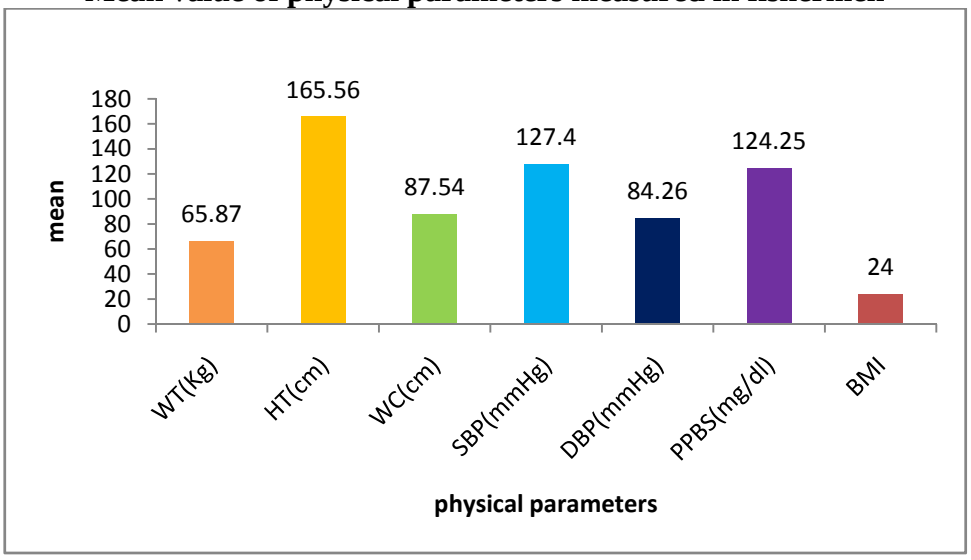


Table 7

Mean values of physical parameters measured in the study population (N=519)

Physical parameters	Mean	95% CI
Weight (kg)	65.87	64.75-66.99
Height (cm)	165.56	165-166.12
Waist circumference(cm)	87.54	86.48-88.60
Systolic blood pressure(mmHg)	127.40	125.52-129.28
Diastolic blood pressure(mmHg)	84.26	83.04-85.48
PPBS (mg/dl)	124.25	118.69-129.82
BMI	24.00	23.62-24.38

Table 7 shows the mean weight of the sample population was 65.87 kg and mean height was 165.56cm. Mean WC was 87.54± 12.29. The average SBP and DBP was 127.40 and 84.26 mmHg respectively. The mean PPBS of the study group was found to be 124.25 mmHg (95% CI 118.69-129.82). The mean BMI was 24± 4.38 kg/m^2, which by definition falls in the overweight category.

6.3 PREVALENCE OF PHYSICAL MORBIDITY

Figure 7

Prevalence of physical morbidity in the study population

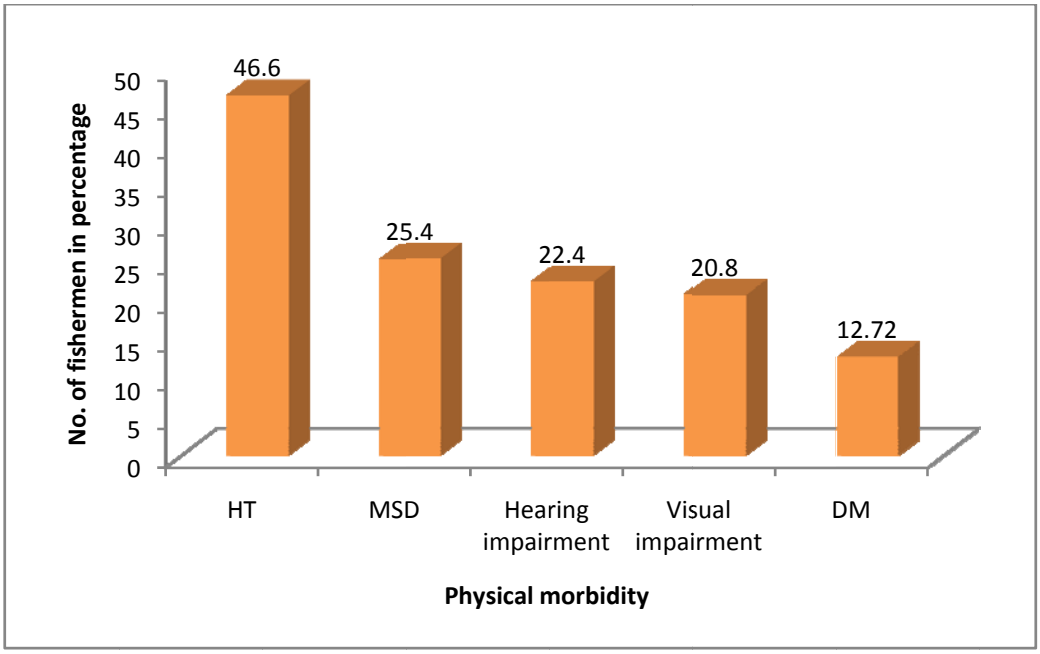


Table 8

Distribution of health related morbidity among fishermen (N=519)

Morbidity studied	Frequency	Percentage
Hypertension	242	46.60
Musculoskeletal problems	132	25.40
Hearing impairment	116	22.40
Visual impairment	108	20.80
Diabetes Mellitus	66	12.72

Table 8 reveals that hypertension was the most common morbidity (46.60%) in the sample population followed by musculoskeletal disorder (25.40). The prevalence of hearing and visual impairment was also found to be high. Nearly one in every five individuals has vision and hearing loss. Overall, the prevalence of diabetes was 12.72%.

Figure 8

Magnitude of physical morbidity in different age group

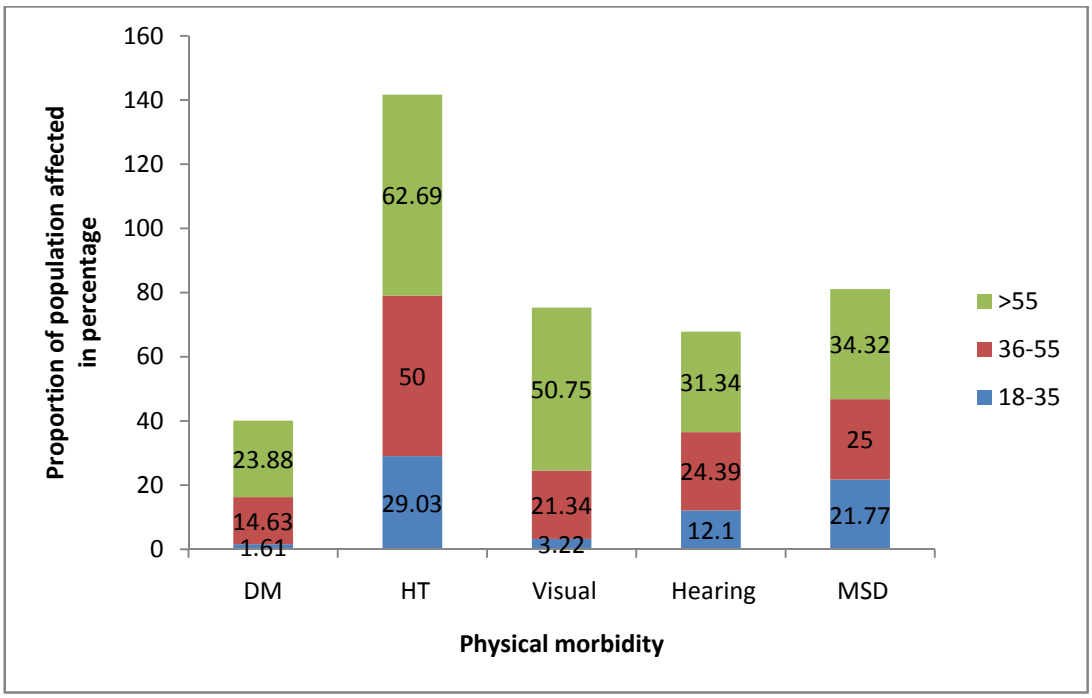


Figure 9

Frequency distribution of morbidity in fishermen based on socioeconomic status

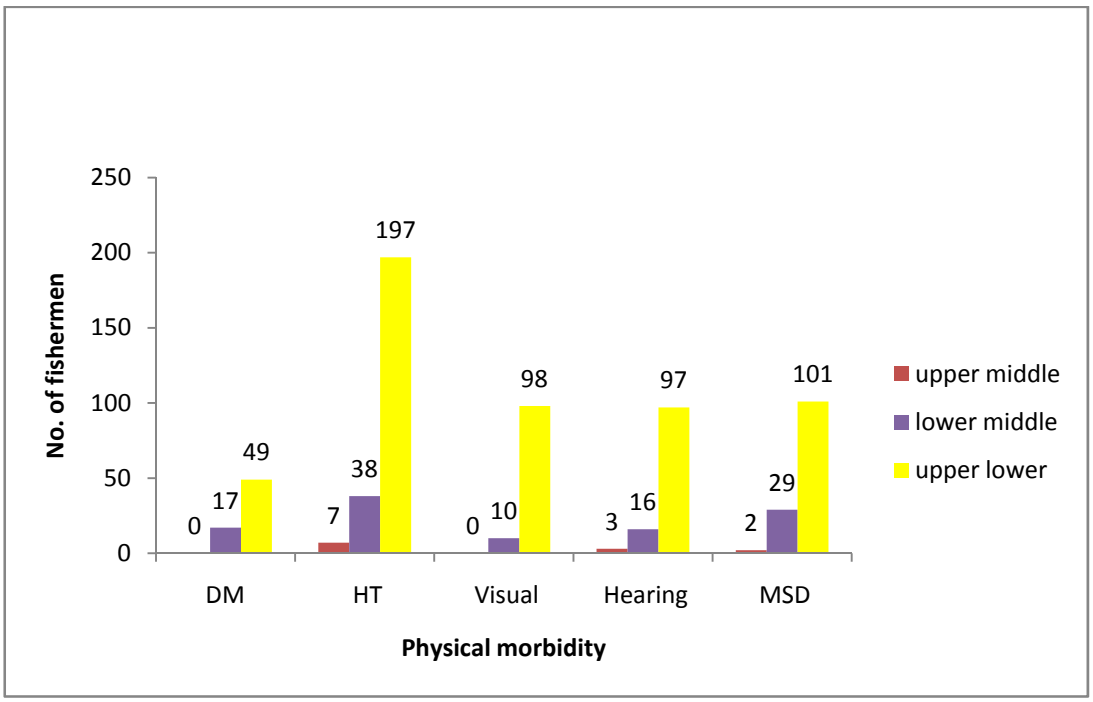
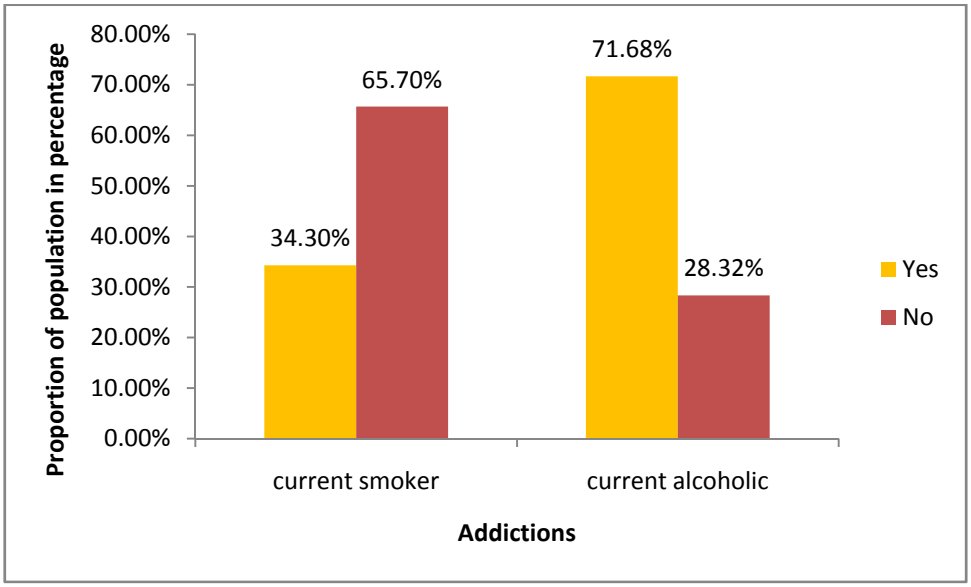


Figure 10

Prevalence of tobacco and alcohol consumption among study population



6.4 DIABETES MELLITUS AND SOCIODEMOGRAPHIC VARIABLES

Table 9

Association of the prevalence of diabetes with socioeconomic and demographic parameters (N=519)

Parameters	Prevalence of diabetes			$\chi 2$	P value	Inference
	Yes	No	Total			
AGE (years)				20.26#	0.00003	Significant
18-35	2(1.61) (3.03)	122(98.39) (26.93)	124			
36-55	48(14.63) (72.73)	280(85.36) (61.81)	328			
>55	16(23.88) (24.24)	51(76.12) (11.26)	67			
Education				0.03	0.852162	Not significant
Illiterate	21(13.12) (31.82)	139(86.87) (30.68)	160			
literate	45(12.53) (68.18)	314(87.46) (69.31)	359			
Alternate job				0.54	0.460502	Not significant
Yes	9(15.79) (13.64)	48(84.21) (10.60)	57			
No	57(12.34) (86.36)	405(87.66) (89.40)	462			
Socioeconomic status				3.595#	0.1657	Not significant
Upper middle	0	16(100) (3.53)	16			
Lower middle	17(18.28) (25.76)	76(81.72) (16.78)	93			
Upper lower	49(11.95) (74.24)	361(88.05) (79.69)	410			

*Figures in the parenthesis indicate per cent to respective row and column totals.

# indicates Yates correction for value in the cell applied

Table 9 summarises the results of association between diabetes mellitus and socioeconomic and demographic risk factors of the study population. Around 72% of

participants with diabetes mellitus belong to the middle age group but the proportion of individuals with diabetes mellitus (23.88 per cent) was highest in the older age group. There was no significant difference seen between the prevalence of diabetes among the literate and illiterate participants. All the diabetic participants in the study were married, though marital status and DM did not show any statistical significance. 74.24 per cent of diabetic people belonged to the upper lower socioeconomic status scale.

6.4.1 DIABETES MELLITUS AND OCCUPATIONAL CHARACTERISTICS

Table 10

Association between the prevalence of diabetes and occupational characteristics (N=519)

Parameters	Prevalence of diabetes			$\chi 2$	P value	Inference
	Yes	No	Total			
Boat ownership				0.64	0.425451	Not significant
Own	8(16.33) (12.12)	41(83.67) (9.05)	49			
others	58(12.34) (87.88)	412(87.66) (90.95)	470			
Years of fishing				14.002#	0.0009	Significant
1-10	3(3.75) (4.54)	77(96.25) (17.00)	80			
11-20	13(8.12) (19.70)	147(91.87) (32.45)	160			
>20	50(17.92) (75.76)	229(82.08) (50.55)	279			
Type of boat				2.374#	0.3051	Not significant
Unmechanised	19(17.43) (28.79)	90(82.57) (19.87)	109			
Mechanised	47(11.69) (71.21)	355(88.31) (78.37)	402			
Both	0	8(100) (1.77)	8			
Workings days				4.54	0.208704	Not significant
< 1 week	10(12.82) (15.15)	68(87.18) (15.01)	78			
1-2 week	7(9.09) (10.60)	70(90.91) (15.45)	77			
2-3 week	23(10.75) (34.85)	191(89.25) (42.16)	214			
3-4 week	26(17.33) (39.39)	124(82.67) (27.37)	150			

*Figures in the parenthesis indicate per cent to respective row and column totals.

# indicates Yates correction for value in the cell applied

Table 10 shows that there was no significant difference noted between the boat ownership, type of boat and the prevalence of diabetes mellitus.

There was significant difference observed between years of fishing and prevalence of diabetes. Nearly three fourth (75.76%) of diabetic prevalence was seen in fishermen with more than 20 years of fishing experience.

Although the use of mechanised boat and working days of more than 3-4 weeks showed more prevalence of Diabetes Mellitus, but the significance of this finding could not be proved statistically.

6.4.2 DIABETES MELLITUS AND FOOD HABITS AND ADDICTIONS

Table 11

Association of the prevalence of diabetes with food habits and addictions

Parameters	Prevalence of diabetes			$\chi 2$	P value	Inference
	Yes	No	Total			
Fried fish				13.87#	0.0001	Not significant
Never	3(60.00) (4.54)	2(40.00) (0.44)	5			
Daily	4(4.49) (6.06)	85(95.50) (18.76)	89			
Fruits intake				0.003#	0.9563	Not significant
Daily	19(11.58) (28.79)	145(88.41) (32.01)	164			
Never	3(9.37) (4.54)	29(90.62) (6.40)	32			
Current smoker						
Present	16(8.94) (24.24)	163(91.06) (35.98)	179	3.51	0.0608	Not significant
Absent	50(14.70) (75.76)	290(85.29) (64.01)	340			
Current alcohol consumption						
Present	43(11.56) (65.15)	329(88.44) (72.63)	372	1.59	0.2079	Not significant
Absent	23(15.65) (34.85)	124(84.35) (27.37)	147			

*Figures in the parenthesis indicate per cent to respective row and column totals.

# indicates Yates correction for value in the cell applied

From table 11, although the proportion of individuals with diabetes mellitus was 60% in section of the study group who never consumed fried fish than who did daily, but the results was not statistically significant. There was no significant difference in the prevalence of DM with frequency of fruit consumption. The study could not show a significant difference in the prevalence of DM with current smokers or current alcohol consumers.

6.4.3 DIABETES MELLITUS AND FAT DISTRIBUTION AND FAMILY HISTORY

Figure 11

Prevalence of Diabetes Mellitus in fishermen based on family history of diabetes

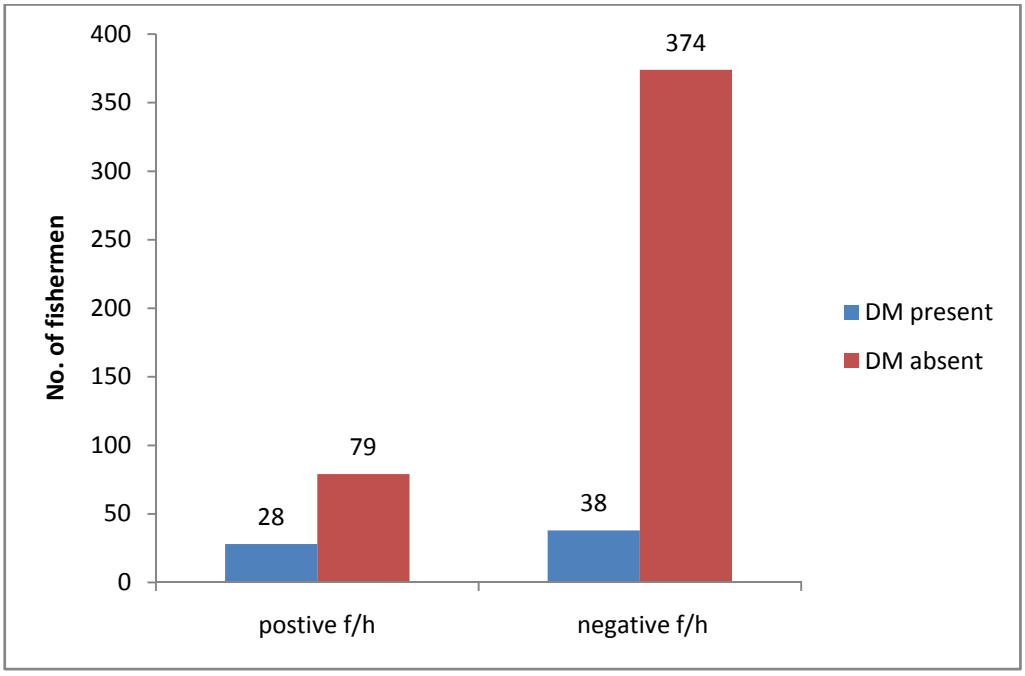


Table 12

Association of the prevalence of diabetes with physical activity and obesity (N=519)

Parameters	Prevalence of diabetes			$\chi 2$	P value	Inference
	Yes	No	Total			
Exercise				25.45	0.0000	significant
Yes	23(30.67) (34.85)	52(69.33) (11.48)	75			
No	43(9.68) (65.15)	401(90.31) (88.52)	444			
BMI				6.24	0.044159	significant
Normal	21(8.94) (31.82)	214(91.06) (47.24)	235			
Overweight	11(13.25) (16.67)	72(86.75) (15.89)	83			
Obesity	34(16.91) (51.51)	167(83.08) (36.86)	201			
Waist circumference				9.82	0.001724	significant
Normal (<90cm)	26(8.75) (39.39)	271(91.24) (59.82)	297			
Abnormal (≥90cm)	40(18.01) (60.60)	182(81.98) (40.18)	222			
F/H diabetes Mellitus						
Present	28(26.17) (42.42)	79(73.83) (17.44)	107	21.97	0.000000	Significant
Absent	38(9.22) (57.57)	374(90.78) (82.56)	412			
Hypertension						
Present	43(17.77) (65.15)	199(82.23) (43.93)	242	10.43	0.001243	Significant
Absent	23(8.30) (34.85)	254(91.70) (56.07)	277			

*Figures in the parenthesis indicate per cent to respective row and column totals.

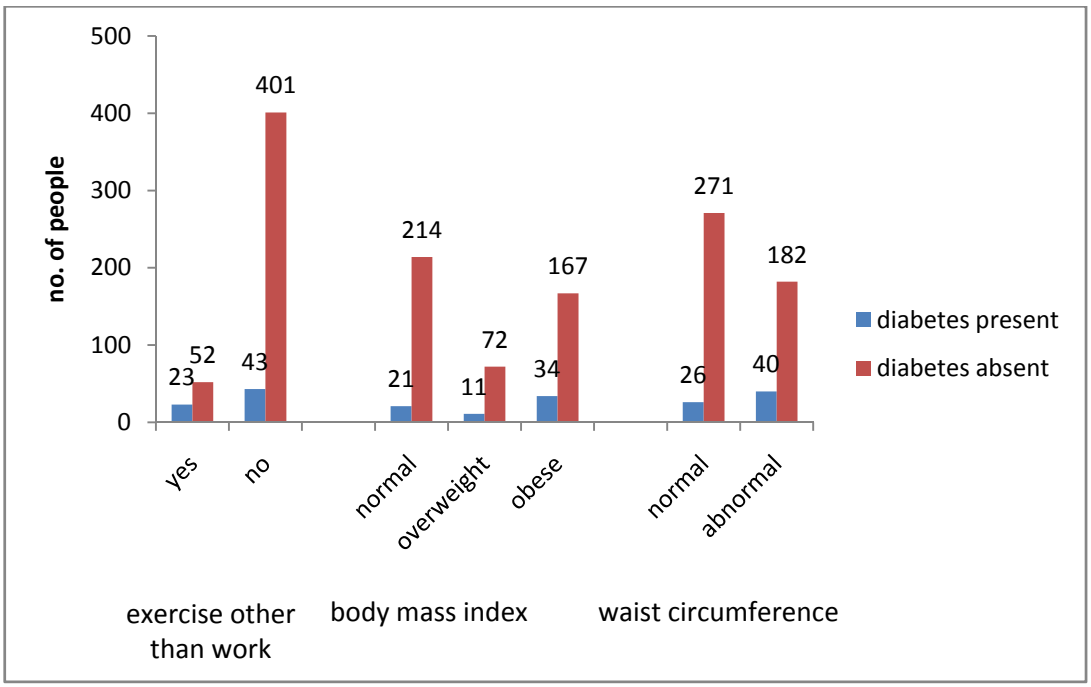
From the table 12 it was seen that the prevalence of DM was 65.15% in individuals who did no exercise outside of work, which was found to be statistically significant.

Obese individuals in the study had a higher prevalence of DM. Nearly half (51.15%) of the total DM prevalence in fishermen was seen in obese individuals, which was statistically significant. Waist circumference showed a significant correlation with prevalence of DM. Approximately 60% of the overall prevalence of DM was seen with central obesity.

Family history of DM in the population showed a significant association with prevalence of DM. Out of the total of 107 individuals with positive family history for DM, 26.17% of them had DM, which was statistically significant.

Figure 12

Frequency distribution of Diabetes Mellitus in fishermen in relation to Exercise, BMI and WC



6.5 HYPERTENSION AND SOCIODEMOGRAPHIC VARIABLES

Table 13

Association of the prevalence of hypertension with socioeconomic and demographic parameters (N=519)

Parameters	Prevalence of hypertension			$\chi 2$	P value	Inference
	Yes	No	Total			
Age (yrs)				23.87	0.0000066	Significant
18-35	36(29.03) (14.88)	88(70.97) (31.77)	124			
36-55	164(50) (67.77)	164(50) (34.82)	328			
>55	42(62.69) (17.35)	25(37.31) (5.31)	67			
Education				0.01	0.940005	Not significant
Illiterate	75(46.87) (30.99)	85(53.12) (18.05)	160			
Literate	167(46.52) (69)	192(53.48) (40.76)	359			
Marital status				5.75	0.016478	Significant
Married	231(48.12) (95.45)	249(51.87) (52.87)	480			
Unmarried	11(28.2) (4.54)	28(71.79) (5.94)	39			
Alternate job				0.20	0.656984	Not significant
Yes	25(43.86) (10.33)	32(56.14) (6.79)	57			
No	217(46.97) (89.67)	245(53.03) (52.02)	462			
Socioeconomic status				1.13	0.442857	Not significant
Upper middle	7(43.75) (2.89)	9(56.25) (1.91)	16			
Lower middle	38(40.86) (15.7)	55(59.14) (11.68)	93			
Upper lower	197(48.05) (81.4)	213(51.95) (45.22)	410			

*Figures in the parenthesis indicate per cent to respective row and column totals.

Data in Table 13 shows that 67.77 per cent of the hypertensive individuals are in the middle age group. The highest proportion (62.69%) of hypertensive individuals were seen in the old age group. The difference in prevalence of hypertension with age was found to be statistically significant.

The literacy level of the surveyed people did not show any significant association with hypertension. The proportion of hypertensive individuals in both group was the same.

Nearly 48% of the married people had hypertension which was seen to be a significant difference. Majority of the hypertensive (81.4 per cent) belonged to the upper lower socioeconomic status.

6.5.1 HYPERTENSION AND OCCUPATIONAL CHARACTERISTICS

Table 14 shown below presents that prevalence of hypertension was similar irrespective of the boat ownership. The increase in prevalence of hypertension was significantly correlated with the increase in years of experience in fishing. The prevalence of hypertension was found to be higher in fishermen (56.48%) that used mechanised boat, which was found to be statistically significant. The proportion of fishermen involved in fishing activity for more than 3 to 4 weeks in a month showed increased (53.33%) prevalence of hypertension, but the finding was not statistically significant.

Table 14

Association between the prevalence of hypertension and occupational characteristics (N=519)

Parameters	Prevalence of hypertension			$\chi 2$	P value	Inference
	Yes	No	Total			
Boat ownership				0.12	0.7287	Not significant
Own	24(48.98) (9.92)	25(51.02) (5.31)	49			
Others	218(46.38) (90.08)	252(53.62) (53.5)	470			
Years of fishing				19.16	0.0000	Significant
1-10	20(25) (8.26)	60(75) (12.74)	80			
11-20	75(46.87) (30.99)	85(53.12) (18.05)	160			
>20	147(52.69) (60.74)	132(47.31) (28.02)	279			
Type of boat				10.51#	0.0052	Significant
Unmechanised	61(56.48) (25.21)	47(43.52) (9.98)	108			
Mechanised	180(43.58) (74.38)	233(56.42) (49.47)	413			
Both	1(12.5) (0.41)	7(87.5) (1.49)	8			
Workings days in sea per month				4.89	0.1803	Not significant
< 1 week	31(39.74) (12.81)	47(60.26) (9.98)	78			
1-2 week	37(48.05) (15.29)	40(51.95) (8.49)	77			
2-3 week	94(43.92) (38.84)	120(56.07) (25.48)	214			
3-4 week	80(53.33) (33.06)	70(46.67) (14.86)	150			

*Figures in the parenthesis indicate per cent to respective row and column totals.

# indicates Yates correction for value in the cell applied

6.5.2 HYPERTENSION AND FOOD HABITS AND ADDICTIONS

Table 15

Association between the prevalence of hypertension and food habits

Parameters	Prevalence of hypertension			$\chi 2$	P value	Inference
	Yes	No	Total			
Fried fish				0.76	0.99318	Not significant
Daily	39(43.82) (16.11)	50(56.18) (10.61)	89			
Never	17(56.67) (7.02)	13(43.33) (2.76)	30			
Fruits				5.538	0.477	Not significant
Daily	68(41.46) (28.1)	96(58.54) (20.38)	164			
Never	30(41.09) (12.4)	43(58.9) (9.13)	73			
Current smoking						
Present	75(42.13) (30.99)	104(57.86) (21.87)	179	2.20	0.138201	Not significant
Absent	167(48.97) (69)	173(51.03) (36.94)	340			
Current alcohol user						
Present	182(48.92) (75.21)	190(51.07) (40.34)	372	2.78	0.095235	Not significant
Absent	60(40.82) (24.79)	87(59.18) (18.47)	147			

*Figures in the parenthesis indicate per cent to respective row and column totals.

Table 15 shows that the prevalence of hypertension was nearly equal in population that took fried fish daily and those that never ate fried fish. There was no significant difference in the prevalence of hypertension with frequency of fruit consumption.

In the present study, significant difference in the prevalence of hypertension with current smokers could not be seen. The proportion of participants with

hypertension in both the groups was close to 45%. Nearly three-fourth of the sample population that were current alcohol users were found to have hypertension, but the finding was not statistically significant.

6.5.3 HYPERTENSION AND FAT DISTRIBUTION AND FAMILY HISTORY

Figure 13
Frequency distribution of Hypertension in fishermen in relation to Exercise, BMI and WC

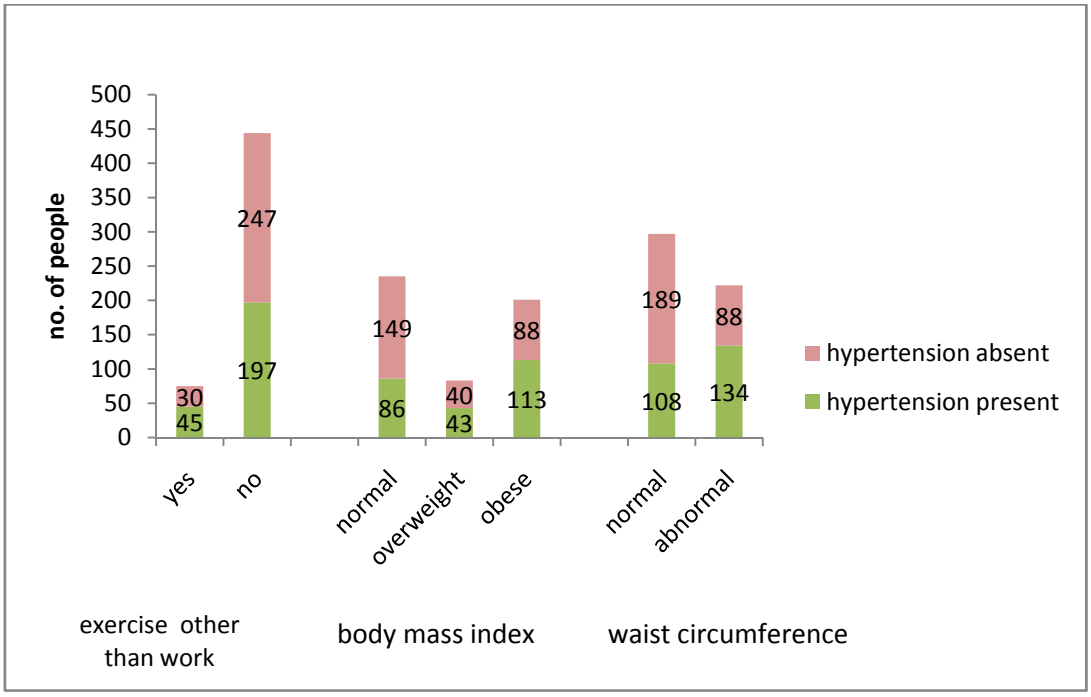


Table 16 shows that 81.40% prevalence was seen in individuals who had no exercise outside of their work time, which was found to have statistical significance. Similarly higher body mass index ($\geq$25kg/m^2) had significant association with higher prevalence of hypertension.

Close to 50% prevalence of hypertension was seen in obese fishermen. The presence of abdominal obesity in the participants had a very significant association with prevalence of hypertension; with nearly 60% proportion of individuals with abnormal waist circumference had hypertension.

With regard to relation of hypertension prevalence in individuals with positive family history of hypertension, the present study did not find any significant association. However the association between hypertension with presence of diabetes in the individuals showed a very significant difference. Nearly 2/3 rd (65.15%) of diabetic study population had prevalence of hypertension.

Table 16
Association of the prevalence of hypertension with obesity and family history (N=519)

Parameters	Prevalence of hypertension			$\chi 2$	P value	Inference
	Yes	No	Total			
Exercise				6.30	0.01208	significant
Yes	45(60) (18.59)	30(40) (6.37)	75			
No	197(44.37) (81.4)	247(55.63) (52.44)	444			
BMI				17.83	0.00013	significant
Normal	86(36.59) (35.54)	149(63.40) (53.79)	235			
Overweight	43(51.81) (17.77)	40(48.19) (14.44)	83			
Obesity	113(56.22) (46.69)	88(43.78) (31.77)	201			
Waist circumference				29.40	0.00000	significant
Normal (<90cm)	108(36.36) (44.63)	189(63.63) (40.13)	297			
Abnormal (≥90cm)	134(60.36) (55.37)	88(39.64) (18.68)	222			
F/H hypertension						
Present	19(45.24) (7.85)	23(54.76) (4.88)	42	0.04	0.85059	Not significant
Absent	223(46.75) (92.15)	254(53.25) (53.93)	477			
Diabetes mellitus						
Present	43(65.15) (17.77)	23(34.85) (8.30)	66	10.43	0.00124	significant
Absent	199(43.93) (82.23)	254(56.07) (91.70)	453			

*Figures in the parenthesis indicate per cent to respective row and column totals.

6.6 VISUAL IMPAIRMENT AND SOCIODEMOGRAPHIC VARIABLES

Table 17

Association of the prevalence of visual impairment with socioeconomic and demographic parameters. (N=519)

Parameters	Prevalence of visual impairment			$\chi 2$	P value	Inference
	Yes	No	Total			
Age (yrs)				56.88#	0.00000	Significant
18-35	4(3.22) (3.7)	120(96.77) (29.2)	124			
36-55	70(21.34) (64.81)	258(78.66) (62.77)	328			
>55	34(50.75) (31.48)	33(49.25) (8.03)	67			
Education				17.19	0.00003	Significant
Illiterate	51(31.87) (47.22)	109(68.12) (26.52)	160			
Literate	57(15.88) (52.78)	302(84.12) (73.48)	359			
Alternate job				0.41	0.51978	Not significant
Yes	10(17.54) (9.26)	47(82.46) (11.43)	57			
No	98(21.21) (90.74)	364(78.79) (88.56)	462			
Socio-economic				10.34#	0.0056	Significant
Upper middle	0() ()	16(100) (3.89)	16			
Lower middle	10(10.75) (9.26)	83(89.25) (20.19)	93			
Upper lower	98(23.9) (90.74)	312(76.1) (75.91)	410			

*Figures in the parenthesis indicate per cent to respective row and column totals.

# indicates Yates correction for value in the cell applied

Table 17 shows that age had a very significant association with visual impairment. More than 50% of the sample population above the age of 55 years had visual impairment of less than 6/18. Visual impairment was present in greater proportion in individuals with no formal education. One in every third illiterate fishermen had visual impairment, which was found to be statistically significant.

There was no significant association between visual loss and people doing alternate job other than fishing.

In comparison to no visual impairment in upper middle class, 90.74% prevalence of visual impairment was seen in population in lower socioeconomic strata, which was found to have statistical significance.

6.6.1 VISUAL IMPAIRMENT AND OCCUPATIONAL CHARACTERISTICS

Table 18
Association between the prevalence of visual impairment and occupational characteristics (N=519)

Parameters	Prevalence of visual impairment			χ^2	P value	Inference
	Yes	No	Total			
Boat ownership				1.40	0.23717	Not significant
Own	7(14.28) (6.48)	42(85.71) (10.22)	49			
Others	101(21.49) (93.52)	369(78.51) (89.78)	470			
Years of fishing				29.88	0.000000	Significant
1-10	6(7.5) (5.55)	74(92.5) (18)	80			
11-20	19(11.87) (17.59)	141(88.12) (34.31)	160			
>20	83(29.75) (76.85)	196(70.25) (47.69)	279			
Type of boat				8.09	0.017535	Significant
Unmechanised	33(30.55) (30.55)	75(69.44) (18.25)	108			
Mechanised	73(18.11) (67.59)	330(81.88) (80.29)	403			
Both	2(25) (1.85)	6(75) (1.5)	8			
Workings days				0.78	0.854226	Not significant
< 1 week	19(24.36) (17.59)	59(75.64) (14.35)	78			
1-2 week	16(20.78) (14.81)	61(79.22) (14.84)	77			
2-3 week	42(19.63) (38.89)	172(80.37) (41.85)	214			
3-4 week	31(20.67) (28.7)	119(79.33) (28.95)	150			

*Figures in the parenthesis indicate per cent to respective row and column totals.

Table 18 shows that no statistical significant association was observed with boat ownership and visual impairment. Table shows that longer the years spent in fishing, higher is the chance of visual impairment, which was found to be statistically significant. The fishermen with more than 20 years of work in fishing had 76.85% prevalence of visual impairment..

The prevalence of visual impairment was 67.59 per cent in people using mechanised boat, which was seen to be statistically significant. On a monthly average, the fishermen who worked for more than 2 to 3 weeks per month in sea had a visual impairment prevalence of 38.89 per cent and those working for more than 3 to 4 weeks had 28.7 per cent prevalence which was not found to be statistically significant.

Table 19

Association between the prevalence of visual impairment and sun exposure (N=519)

Duration of sun exposure	**Yes**	**No**	**Total**	χ^2	**P value**	**Inference**
≤4hrs	48(26.52) (44.44)	133(73.48) (32.36)	181	5.499	0.019	significant
>4hrs	60(17.75) (55.55)	278(82.25) (67.64)	338			
PPE from sun exposure				3.48	0.0622	Not significant
Yes	18(30) (16.67)	42(70) (10.22)	60			
No	90(19.61) (83.33)	369(80.39) (89.78)	459			

*Figures in the parenthesis indicate per cent to respective row and column totals.

Table 19 shows that increased prevalence of visual impairment was seen in population with sun exposure more than four hours. The prevalence of visual impairment was 55.55% in fishermen with sun exposure more than 4 hours, which was found to be statistically significant.

Around 83% of sample population, who had never used any personal protection against sunlight developed visual impairment. but the result was not statistically significant.

6.6.2 VISUAL IMPAIRMENT AND FOOD HABITS AND ADDICTIONS

Table 20 given below shows that the prevalence of visual impairment had no significant relation with fried fish consumption. The proportion of population who were current smokers had increased prevalence of visual impairment, but the finding was not statistically significant. Similarly two- third of the prevalence of visual impairment was seen in current alcoholics, yet the significant difference could not be seen.

Table 20

Association between the prevalence of Visual impairment and food habits and addictions

Parameters	Prevalence of visual impairment			$\chi 2$	P value	Inference
	Yes	No	Total			
Fried fish consumption				0.032#	0.858	Not significant
Daily	12(13.48) (11.11)	77(86.52) (18.73)	89			
Never	3(10) (2.78)	27(90) (6.57)	30			
Current smoker						
Present	42(23.59) (38.89)	137(76.4) (33.09)	179	1.28	0.25859	Not significant
Absent	66(19.35) (61.11)	274(80.64) (66.91)	340			
Current alcohol user						
Present	72(19.35) (66.67)	300(80.64) (72.99)	372	1.69	0.19414	Not significant
Absent	36(24.49) (33.33)	111(75.51) (27)	147			

*Figures in the parenthesis indicate per cent to respective row and column totals.

# indicates Yates correction for value in the cell applied

6.6.3 VISUAL IMPAIRMENT, FAT DISTRIBUTION, DIABETES AND HYPERTENSION

Table 21 given below presents that the prevalence of visual impairment in people who had no exercise outside of work was 86.11%. but the finding was not statistically significant.

Table 21

Association of the prevalence of visual impairment with physical activity and obesity (N=519)

Exercise	Present	Absent	Total	$\chi 2$	P value	Inference
Yes	15(20) (13.89)	60(80) (14.6)	75	0.035	0.8515	Not significant
No	93(20.94) (86.11)	351(79.05) (85.4)	444			
BMI				10.76	0.004609	Significant
Normal	64(27.23) (59.26)	171(72.76) (41.60)	235			
Overweight	13(15.66) (12.04)	70(84.34) (17.03)	83			
Obesity	31(15.42) (28.70)	170(84.58) (41.36)	201			
Waist circumference				0.23	0.63118	Not significant
Normal(<90cm)	64(21.55) (59.26)	233(78.45) (56.69)	297			
Abnormal≥90cm	44(19.82) (40.74)	178(80.18) (43.31)	222			
Diabetes Mellitus						
Present	17(25.76) (15.74)	49(74.24) (11.92)	66	1.12	0.289152	Not significant
Absent	91(20.09) (84.26)	362(79.91) (88.08)	453			
Hypertension						
Present	49(21.30) (54.63)	193(78.70) (53.04)	242	0.087	0.7680	Not significant
Absent	59(20.25) (45.37)	218(79.75) (46.96)	277			

*Figures in the parenthesis indicate per cent to respective row and column totals.

In the study the prevalence of visual impairment in individuals with normal BMI was 59.26%. In comparison the prevalence was 28.70% and 12.04% in obese and overweight individuals which was found to be statistically significant.

The presence of abdominal obesity showed no significant association with visual impairment. The prevalence of visual impairment did not vary with changes in waist circumference.

The proportion of diabetic individuals showed more prevalence of visual impairment (25.76%), but the observation was not statistically significant. Similarly the prevalence of visual impairment (54.63%) was found to be more in sample population with hypertension, but the difference was not significant.

Figure 14

Demographic risk factors significantly associated with visual impairment

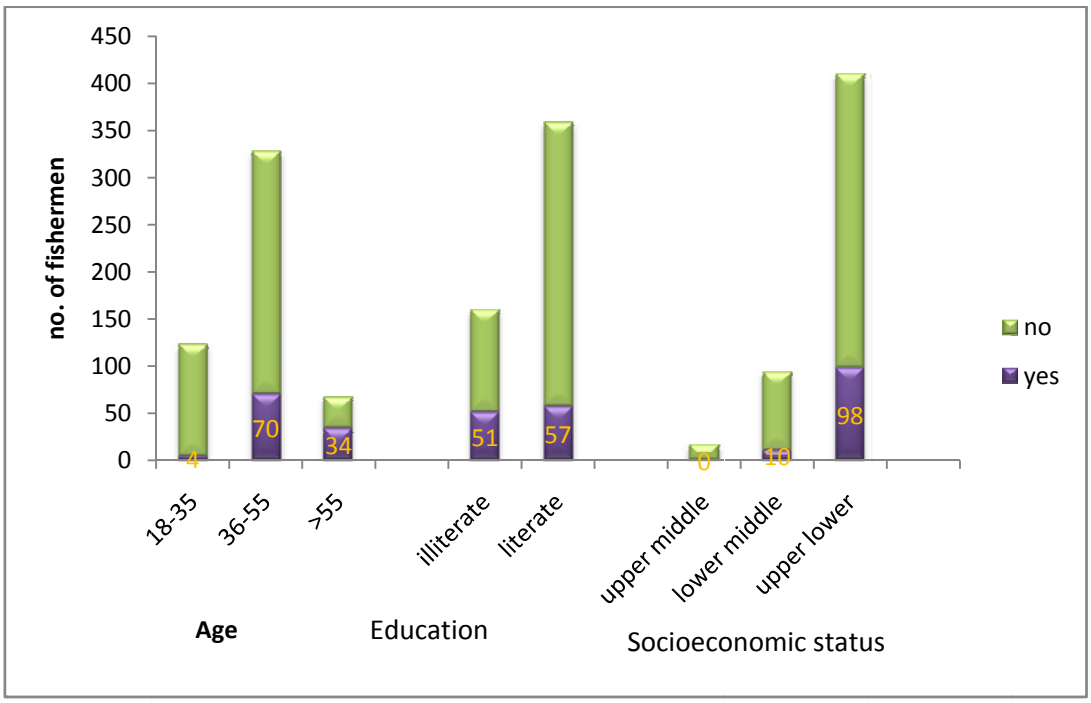
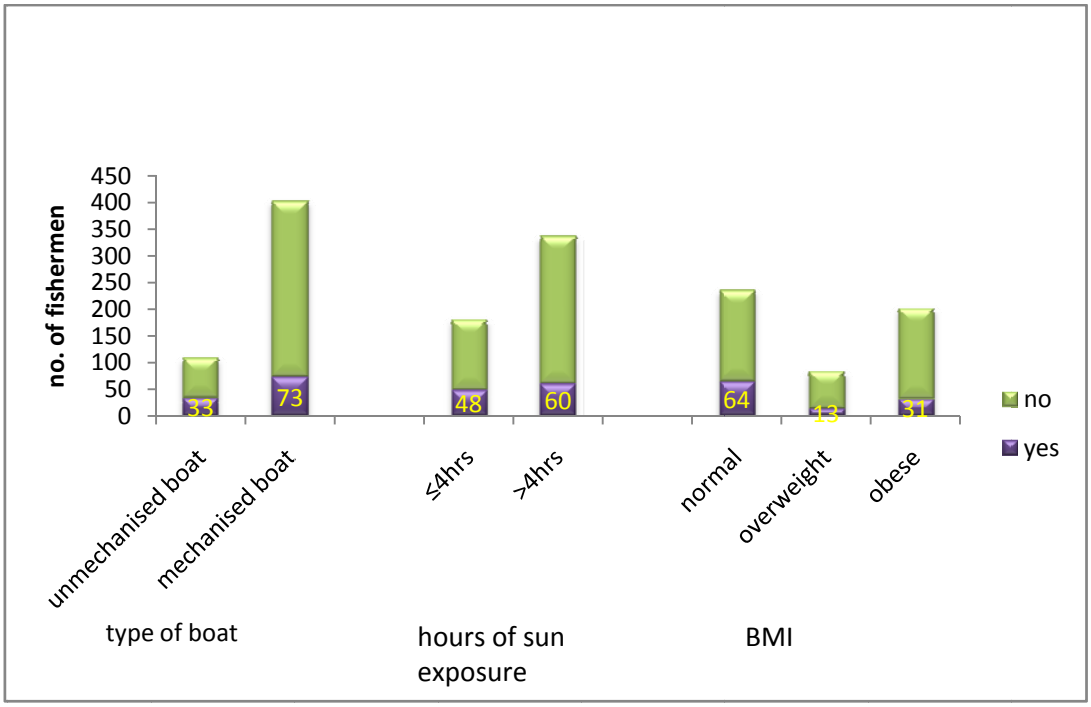


Figure 15

Occupational risk factors significantly associated with visual impairment



6.7 HEARING IMPAIRMENT AND SOCIODEMOGRAPHIC VARIABLES.

Table 22 states that age was a significant risk factor in the prevalence of hearing impairment. One- fourth of the individuals in the middle age group are affected with hearing impairment. The prevalence of hearing impairment increased to one-third in age group above 55 yrs. Although higher proportion of illiterate fishermen had hearing impairment, but the finding was not statistically significant. The presence of alternate job in the fishermen had no significant change in the prevalence of hearing impairment.

The relation of hearing impairment with socioeconomic status showed increase prevalence (83.62%) in upper lower socioeconomic group, but the value was not statistically significant.

Table 22

Association of the prevalence of Hearing impairment with socioeconomic and demographic parameters. (N=519)

Parameters	Prevalence of hearing impairment			$\chi 2$	P value	Inference
	Yes	No	Total			
Age (yrs)				11.42	0.003312	Significant
18-35	15(12.1) (12.93)	109(87.9) (27.05)	124			
36-55	80(24.39) (68.96)	248(75.61) (61.54)	328			
>55	21(31.34) (18.1)	46(68.66) (11.41)	67			
Education				3.53	0.060123	Not significant
Illiterate	44(27.5) (37.93)	116(72.5) (28.78)	160			
Literate	72(20.05) (62.07)	287(79.94) (71.21)	359			
Alternate job				2.55	0.110205	Not significant
Yes	8(14.03) (6.9)	49(85.96) (12.16)	57			
No	108(23.38) (93.1)	354(76.62) (87.84)	462			
Socioeconomic status				1.473#	0.4787	Not significant
Upper middle	3(18.75) (2.59)	13(81.25) (3.22)	16			
Lower middle	16(17.2) (13.79)	77(82.79) (19.11)	93			
Upper lower	97(23.66) (83.62)	313(76.34) (77.67)	410			

*Figures in the parenthesis indicate per cent to respective row and column totals.

# indicates Yates correction for value in the cell applied

6.7.1 HEARING IMPAIRMENT AND OCCUPATIONAL CHARACTERISTICS

Table 23

Association between the prevalence of Hearing impairment and occupational characteristics. (N=519)

Parameters	Prevalence of hearing impairment			$\chi 2$	P value	Inference
	Yes	No	Total			
Boat ownership				1.13	0.28747	Not significant
Own	8(16.33) (6.9)	41(83.67) (10.17)	49			
Others	108(22.88) (93.1)	362(76.69) (89.82)	472			
Years fishing				10.01	0.006717	Significant
1-10	11(13.75) (9.48)	69(86.25) (17.12)	80			
11-20	28(17.5) (24.14)	132(82.5) (32.75)	160			
>20	77(27.6) (66.38)	202(72.4) (50.12)	279			
Type of boat				3.79	0.174969	Not significant
Unmechanised	31(28.7) (26.72)	77(71.3) (19.11)	108			
Mechanised	84(20.84) (72.41)	319(79.16) (79.16)	403			
Both	1(12.5) (0.86)	7(87.5) (1.74)	8			
Workings days				4.65	0.199706	Not significant
< 1 week	22(28.2) (18.96)	56(71.79) (13.89)	78			
1-2 week	15(19.48) (12.93)	62(80.52) (15.38)	77			
2-3 week	43(20.09) (37.07)	171(79.91) (42.43)	214			
3-4 week	36(24) (31.03)	114(76) (28.29)	150			

Nearly two-third of the sample population that had more than 20 years of fishing experience developed hearing impairment. The finding was statistically significant. The prevalence of hearing impairment was seen to be 72.41% in mechanised boat users than un mechanised boat users which was 26.72%. The boat

ownership and average monthly days of work in sea had shown to have no significant association with hearing impairment.

6.7.2 HEARING IMPAIRMENT AND NOISE EXPOSURE

Figure 16

Prevalence of noise exposure at work place among fishermen with hearing impairment

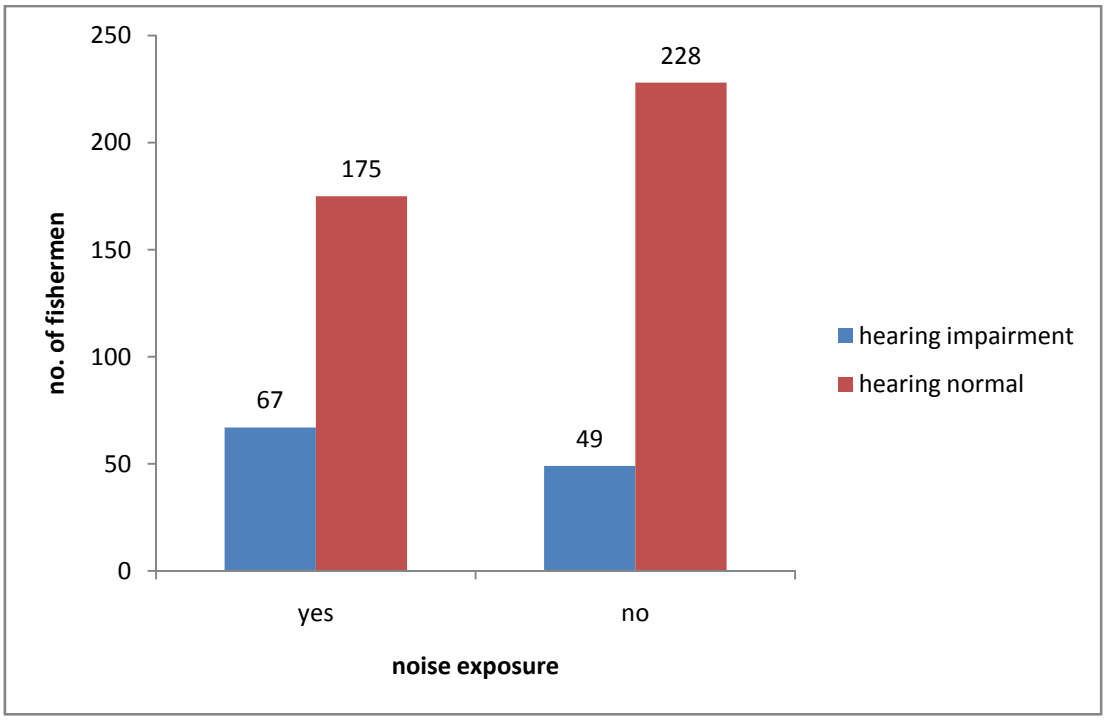


Table 24 given below shows that the prevalence of hearing impairment was seen in sample population exposed to noise in the board. It was seen that 57.76% of the prevalence was seen in sample population exposed to noise, in comparison to 42.24% prevalence seen in group not exposed to noise. The difference was found to be statistically significant. Although 93.1% of the studied population with no PPE use against noise in the board showed prevalence of hearing impairment, but it was not found to have significant difference. There was nearly equal proportion of individuals that suffered hearing impairment depending on the place of work in the boat at work.

Table 24

Association between the prevalence of Hearing impairment and noise exposure. (N=519)

Parameters	Prevalence of hearing impairment			$\chi 2$	P value	Inference
	Yes	No	Total			
Noise				7.44	0.00639	Significant
Yes	67(27.68) (57.76)	175(72.31) (43.42)	242			
No	49(17.69) (42.24)	228(82.31) (56.57)	277			
PPE from noise				3.13	0.077052	Not significant
Yes	8(38.09) (6.9)	13(61.9) (3.22)	21			
No	108(21.69) (93.1)	390(78.31) (96.77)	498			
Place of stay in the boat at work				0.29	0.864121	Not significant
Engine room	8(20.51) (6.90)	31(79.49) (7.69)	39			
Deck	95(22.20) (81.90)	333(77.80) (82.63)	428			
Others	13(25) (11.21)	39(75) (9.68)	52			

*Figures in the parenthesis indicate per cent to respective row and column totals.

6.7.3 HEARING IMPAIRMENT AND ADDICTIONS

Table 25 given below reveals that nearly one-fourth of the current smokers suffered hearing impairment in comparison to one-fifth seen in non smokers, but the finding was statistically significant. With regard to current alcohol users, almost 80% prevalence of hearing impairment was seen in alcoholics. One in every 4 alcoholics had hearing impairment, which was observed to be a significant risk factor.

Table 25

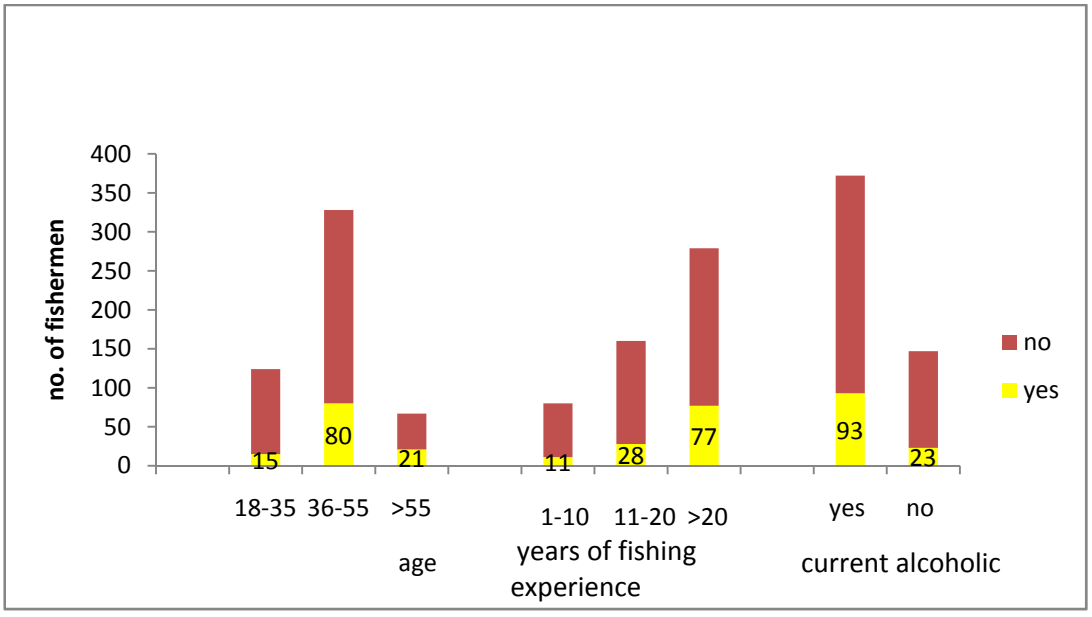
Association between the prevalence of hearing impairment and addictions (N=519)

Parameters	Prevalence of hearing impairment			$\chi 2$	P value	Inference
	Yes	No	Total			
Current tobacco smoking				1.34	0.246979	Not significant
Present	45(25.28) (38.79)	134(74.72) (33)	179			
Absent	71(20.82) (61.2)	269(79.18) (70)	340			
Current alcohol consumption				5.31	0.021182	Significant
Present	93(25) (80.17)	279(75) (69.23)	372			
Absent	23(15.65) (19.83)	124(84.35) (30.77)	147			

*Figures in the parenthesis indicate per cent to respective row and column totals.

Figure 17

Risk factors significantly associated with Hearing impairment



6.7.4 Hearing impairment and fat distribution and other physical morbidity

Table 26

Association of the prevalence of Hearing impairment with obesity, diabetes and hypertension. (N=519)

Parameters	Prevalence of hearing impairment			$\chi 2$	P value	Inference
	Yes	No	Total			
BMI				1.43	0.4886	Not significant
Normal	58(24.68) (50)	177(75.32) (43.92)	235			
Overweight	16(19.28) (13.79)	67(80.72) (16.62)	83			
Obesity	42(20.89) (36.21)	159(79.10) (39.45)	201			
Waist circumference				0.52	0.4714	Not significant
Normal (<90cm)	63(21.21) (54.31)	234(78.79) (58.06)	297			
Abnormal (≥90cm)	53(23.87) (45.69)	169(23.87) (41.93)	222			
Diabetes Mellitus						
Present	15(22.73) (12.93)	51(77.27) (12.65)	66	0.01	0.9373	Not significant
Absent	101(22.29) (87.07)	352(77.70) (87.34)	453			
Hypertension						
Present	58(23.97) (50)	184(76.03) (45.66)	242	0.682	0.4088	Not significant
Absent	58(20.94) (50)	219(79.06) (54.34)	277			

*Figures in the parenthesis indicate per cent to respective row and column totals.

Table 26 shows that there was 50% prevalence of hearing impairment seen in individuals with normal BMI and 36.21% prevalence seen in obese individuals. But the finding was not statistically significant. Similarly abdominal obesity had no significant association with hearing impairment in the population.

The data reveals that proportion of individuals with diabetes mellitus that had hearing impairment was 22.73% which was similar to the non- diabetic group. Likewise the prevalence of hearing impairment was exactly the same in groups with and without hypertension.

6.8 MUSCULOSKELETAL DISORDERS AND SOCIO-DEMOGRAPHIC VARIABLES

Table 27

Association of the prevalence of musculoskeletal problems with socioeconomic and demographic parameters (N=519)

Parameters	Prevalence of musculoskeletal problems			$\chi 2$	P value	Inference
	Yes	No	Total			
AGE (years)				3.70	0.156989	Not significant
18-35	27(21.77) (20.45)	97(78.22) (25.06)	124			
36-55	82(25) (62.12)	246(75) (63.56)	328			
>55	23(34.32) (17.42)	44(65.67) (11.37)	67			
Education				2.54	0.11076	Not significant
Illiterate	48(30) (36.36)	112(70) (28.94)	160			
Literate	84(23.4) (63.64)	275(76.6) (71.06)	359			
Alternate job				0.65	0.419754	Not significant
Yes	17(29.82) (12.88)	40(70.17) (10.33)	57			
No	115(24.89) (87.12)	347(75.11) (89.66)	462			
Socioeconomic status				$2.243^{\#}$	0.3257	Not significant
Upper middle	2(12.5) (1.51)	14(87.5) (3.62)	16			
Lower middle	29(31.18) (21.97)	64(68.82) (16.54)	93			
Upper lower	101(24.63) (76.51)	309(75.36) (79.84)	410			

*Figures in the parenthesis indicate per cent to respective row and column totals.

# indicates Yates correction for value in the cell applied

Table 27 shows that one-third of the overall prevalence of musculoskeletal disorder was seen in middle age group. But considering the proportion of individuals in each age group, the population in older age group had higher prevalence of MSD

The education status of the population did not have significant association with MSD. The proportion of individuals in each group had nearly the same prevalence of MSD. Three- fourth of the prevalence of MSD was seen in lower socioeconomic status. But the findings were not statistically significant.

6.8.1 MUSCULOSKELETAL DISORDERS AND OCCUPATIONAL CHARACTERISTICS

Table 28 given below shows that the boat ownership had no significant association with MSD. In comparison to the population with 11-20 years of fishing activity, individuals with more than 20 years of fishing activity had more than double the prevalence of MSD. The types of boat used for fishing activity showed nearly equal percentage of individuals were affected with MSD in each type. Close to 70% prevalence of MSD was seen in sample population who worked for more than 2 weeks in sea per month. In comparison only 30% prevalence of MSD was seen in population who worked for less than 2 weeks in sea per month.

The table shows that majority (90.15%) of study population involved in repetitive job stress had prevalence of MSD. But the above findings did not show any statistical significance.

Table 28

Association between the prevalence of musculoskeletal problems and occupational characteristics (N=519)

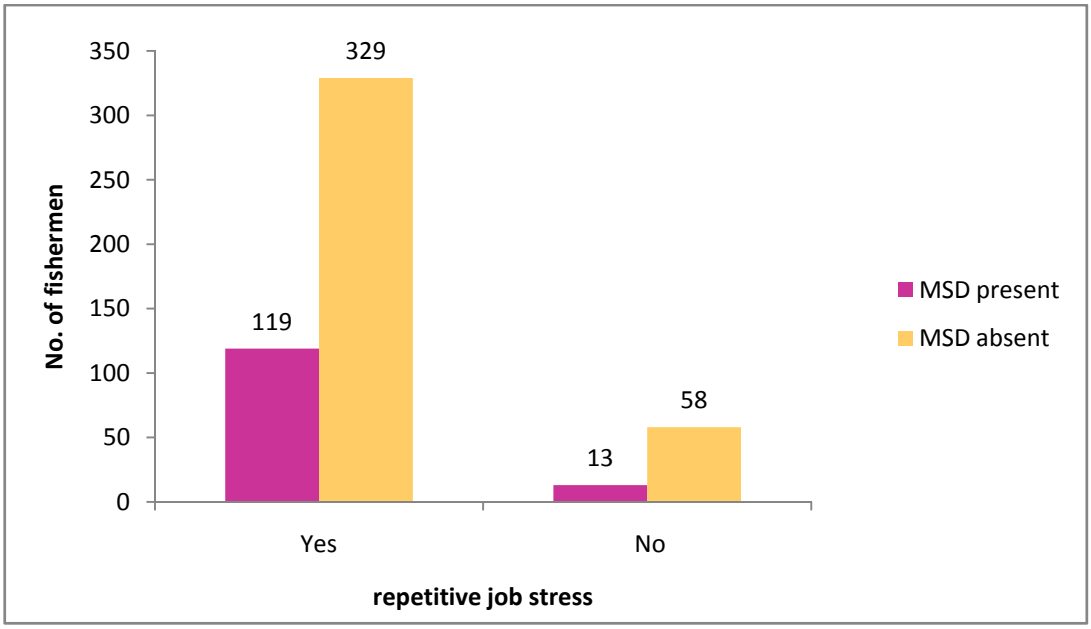
Parameters	Prevalence of musculoskeletal disorders			$\chi 2$	P value	Inference
	Yes	No	Total			
Boat ownership				2.37	0.12398	Not significant
Own	8(16.33) (6.06)	41(83.67) (10.59)	49			
Others	124(26.38) (93.94)	346(73.62) (89.4)	470			
Years of fishing				2.19	0.33382	Not significant
1-10	21(26.25) (15.91)	59(73.75) (15.24)	80			
11-20	34(18.89) (25.76)	126(70) (32.56)	180			
>20	77(27.6) (58.33)	202(72.4) (52.2)	279			
Type of boat						
Unmechanised	27(25) (20.45)	81(75) (20.93)	108	$0.143^{\#}$	0.9309	Not significant
Mechanised	103(25.56) (78.03)	300(74.44) (77.52)	403			
Both	2(25) (1.51)	6(75) (1.55)	8			
Workings days in sea/month						
< 1 week	25(32.05) (18.94)	53(67.95) (13.69)	78	4.16	0.24469	Not significant
1-2 week	15(19.48) (11.36)	62(80.52) (16.02)	77			
2-3 week	58(27.1) (43.94)	156(72.9) (40.31)	214			
3-4 week	34(22.67) (25.76)	116(77.33) (29.97)	150			
Repetitive job stress						
Present	119(26.56) (90.15)	329(73.44) (85.01)	448	2.20	0.13792	Not significant
Absent	13(18.31) (9.85)	58(81.69) (14.99)	71			

*Figures in the parenthesis indicate per cent to respective row and column totals.

$^{\#}$ indicates Yates correction for value in the cell applied

Figure 18

Prevalence of repetitive job stress among fishermen with MSD



6.8.2 MUSCULOSKELETAL DISORDERS AND OTHER PHYSICAL MORBIDITY

Table 29 presents that 32.41% proportion of individuals with visual impairment showed the prevalence of MSD. But the finding was not statistically significant.

With regard to association between MSD and hearing impairment, 35.34% of the individuals with hearing impairment had MSD. The proportion of individuals with MSD who had occupational injury was 32.28%, in comparison to 23.21% who did not. Both the risk factor showed a significant difference ($p<0.05$)

Data shows that the prevalence of MSD in diabetic individuals was 9.85% as against 90.15% in non diabetic individuals. But the proportion of individuals with MSD was nearly the same. Similarly prevalence of MSD in hypertensive population was 60.61% as against 39.39% in population with normal blood pressure. In both

diabetes mellitus and hypertension, the association with MSD was not statistically significant.

Table 29

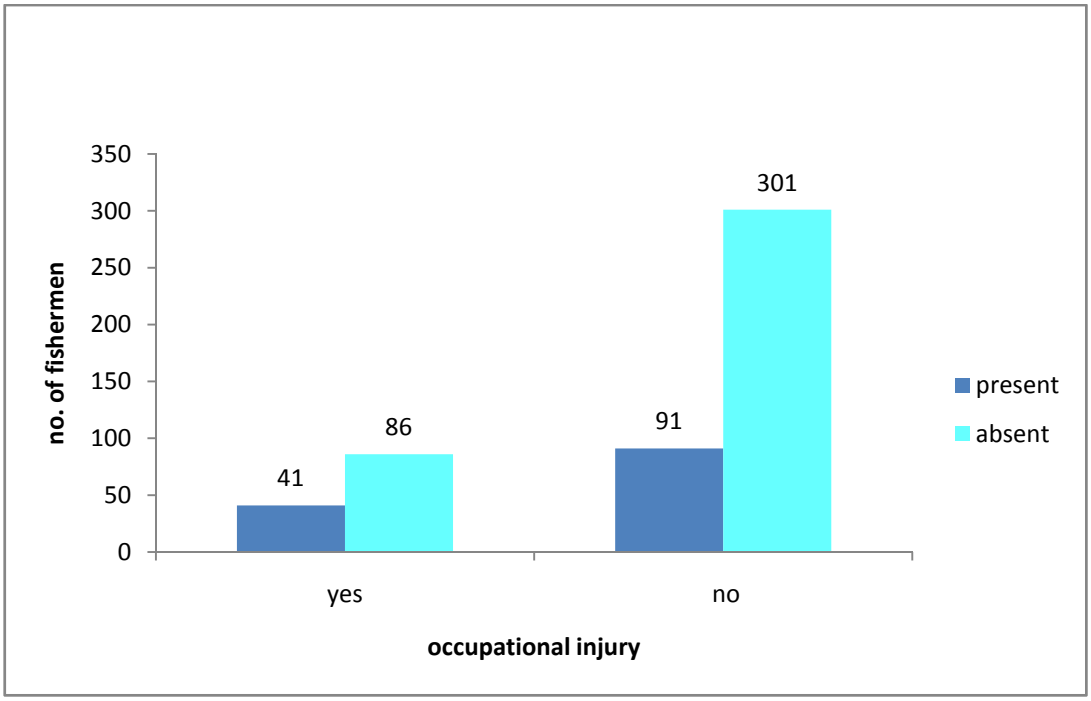
Association between the prevalence of musculoskeletal problems and other physical morbidity (N=519)

Parameters	Prevalence of musculoskeletal problems			$\chi 2$	P value	Inference
	Yes	No	Total			
Visual impairment				3.5	0.061464	Not significant
Present	35(32.41) (26.51)	73(67.59) (18.86)	108			
Absent	97(23.6) (73.48)	314(76.4) (81.14)	411			
Hearing impairment				7.74	0.005407	Significant
Present	41(35.34) (31.06)	75(64.65) (19.38)	116			
Absent	91(22.58) (68.94)	312(77.42) (80.62)	403			
Occupational injury				4.16	0.041386	Significant
Present	41(32.28) (31.06)	86(67.72) (22.22)	127			
Absent	91(23.21) (68.94)	301(76.78) (77.78)	392			
Diabetes mellitus						
Present	13(19.70) (9.85)	53(80.30) (13.69)	66	1.31	0.252016	Not significant
Absent	119(26.27) (90.15)	334(73.73) (86.30)	453			
Hypertension						
Present	52(21.49) (39.39)	190(78.51) (49.09)	242	3.723	0.0536	Not significant
Absent	80(28.88) (60.61)	197(71.12) (50.90)	277			

*Figures in the parenthesis indicate per cent to respective row and column totals.

Figure 19

Prevalence of occupational injury among fishermen with MSD



6.8.3 MUSCULOSKELETAL DISORDERS AND ADDICTIONS, FAT DISTRIBUTION

Table 30 shows that subjects with MSD had no significant association with current smoking. The percentage of respondents with MSD was 72.23% for current alcoholic and 27.27% for non alcoholic. Smoking and alcohol intake did not appear to be associated with MSD.

Nearly 88% of the respondents with MSD had no physical activity outside of work. The sample population with MSD did not show significant association with body mass index. The proportion of individuals in each category of BMI showed similar prevalence of MSD. The relation of abdominal obesity with MSD did not show significant association.

Table 30

Association of the prevalence of musculoskeletal problems with obesity and addictions (N=519)

Parameters	Prevalence of musculoskeletal problems			$\chi 2$	P value	Inference
	Yes	No	total			
Current tobacco smoking				0.02	0.877098	Not significant
Present	46(25.84) (34.85)	133(74.16) (34.11)	179			
Absent	86(25.22) (65.15)	254(74.78) (65.89)	340			
Current alcohol consumption				0.10	0.756299	Not significant
Present	96(25.81) (72.73)	276(74.19) (71.32)	372			
Absent	36(24.49) (27.27)	111(75.51) (28.68)	147			
Exercise						
Yes	16(21.33) (12.12)	59(78.67) (15.24)	75	0.78	0.378015	Not significant
No	116(26.13) (87.88)	328(73.87) (84.75)	444			
BMI						
Normal	63(26.80) (47.73)	172(73.19) (44.44)	235	0.55	0.759554	Not significant
Overweight	19(22.89) (14.39)	64(77.11) (16.54)	83			
Obesity	50(24.87) (37.88)	151(75.12) (39.02)	201			
Waist circumference						
Normal(<90cm)	76(25.59) (57.57)	221(74.41) (57.1)	297	0.01	0.924942	Not significant
Abnormal(≥90cm)	56(25.22) (42.42)	166(74.77) (42.89)	222			

*Figures in the parenthesis indicate per cent to respective row and column totals.

6.9 LOGISTIC REGRESSION

6.9.1 LOGISTIC REGRESSION MODEL FOR DIABETES MELLITUS

Table 31

Parameters significant for the Logistic Regression model for Diabetes Mellitus

S.no	Variables	Estimated Coefficient	Standard Error	Wald Statistic	Sig	Exp (B)
1	Old age	2.764	.808	11.694**	.001	15.868
2	Middle age	2.099	.749	7.855**	.005	8.155
3	Exercise	.882	.346	6.483*	.011	2.415
4	Family history of diabetes	1.204	.317	14.417**	.000	3.333

* significant at 5 per cent level of probability

** significant at 1 per cent level of probability

[Variable(s) entered was: boat mechanised, total stay in sea per month, cooked fish_not daily, fruits_not daily, vegetable_not daily, SES_lower middle, SES upper lower, fried fish_not daily, overweight, obesity, fishing trip_more than one day, old age, middle age, smoker , waist circumference , exercise , education , alcohol intake, hypertension, family history of diabetes.]

Table 31 shows that the log odds for the fishermen going to develop Diabetes. The R statistic for all the significant variables shown in the table were positive and it indicated that increase in value of these variables would increase the likelihood of DM to the tune of their coefficients.

The multiple logistic regression shows that the factors causing Diabetes Mellitus after controlling for the effect of other variables are, increasing age, lack of exercise outside of work and family history of diabetes. The individuals above 55 yrs age group have 15.868 times higher log odds of developing diabetes compared to those in the 18- 35 year group and those in the middle age group have 8.155 times higher log odds of being affected compared to those in the 18- 35 year group. Both the odds are statistically significant.

Individuals who do not exercise have 2.415 times higher risk of developing DM compared to those who exercise and this was statistically significant (p=0.011).

The fishermen with positive family history of DM have 3.333 times higher odds of being affected compared to those who don't have a family history of DM.

6.9.2 LOGISTIC REGRESSION MODEL FOR HYPERTENSION

Table 32

Parameters significant for the Logistic Regression model for Hypertension

S.no	Variables	Estimated Coefficient	Standard Error	Wald Statistic	Sig	Exp (B)
1	Old age	1.321	.367	12.954**	.000	3.747
2	Middle age	.787	.252	9.727**	.002	2.197
3	Type of boat	-.496	.233	4.544*	.033	.609
4	Dried fish daily	1.566	.655	5.716*	.017	4.790
5	Waist circumference	.732	.306	5.709*	.017	2.079
6	Alcohol user	.653	.234	7.818**	.005	1.922

* significant at 5 per cent level of probability

** significant at 1 per cent level of probability

[Variable(s) entered: total stay in sea per mon, cookedfish_daily, fruits_daily, vegetable_daily, SES_upper lower, SES_lower middle, dried fish_daily, fried fish_daily, obesity, overweight, old age, middle age, diabetes mellitus, smoker, waist circumference, exercise, education, alcohol, family history of hypertension, type of boat.]

Table 32 shows the log odds for the fishermen going to be affected by hypertension. The individuals above 55 years have 3.747 times higher odds of developing hypertension compared to the younger age group. Similarly, there was 2.197 times higher odds for individuals in 35- 55 year group compared to younger age group.

Individuals using mechanised boat have 0.609 times lesser odds of developing hypertension when compared to non mechanised boat users.

The daily consumption of salted dried fish in the population has 4.79 times higher log odds of developing hypertension compared to those who don't eat dried fish daily.

The fishermen population with abdominal obesity have 2.079 times higher odds of developing hypertension compared to population with normal waist circumference.

The individuals who are alcoholic have 1.922 times higher log odds of getting high blood pressure when compared to non users of alcohols. All the above variables showed statistically significance.

6.9.3 LOGISTIC REGRESSION MODEL FOR VISUAL IMPAIRMENT

Table 33

Parameters significant for the Logistic Regression model for visual impairment

S.no	Variables	Estimated Coefficient	Standard Error	Wald Statistic	Sig	Exp (B)
1	Middle age	2.117	.539	15.419**	.000	8.303
2	Old age	3.449	.592	33.971**	.000	31.480

** significant at 1 per cent level of probability

[Variable(s) entered : total stay in sea per month, sun exposure, SES_lower middle, SES_upper lower, fishing trip, middle age, old age, diabetes mellitus, smoker, hypertension, personal protection from sunlight.]

Table 33 shows the log odds of having visual impairment in fishermen population. The fishermen above 55 years have a 31.48 times higher log odds of

developing visual impairment and middle age group fishermen have 8.303 times higher odds of developing visual impairment when compared to 18- 35 year age group. The finding was statistically significant.

6.9.4 LOGISTIC REGRESSION MODEL FOR HEARING IMPAIRMENT

Table 34
Parameters significant for the Logistic Regression model for hearing impairment

S.no	Variables	Estimated Coefficient	Standard Error	Wald Statistic	Sig	Exp (B)
1	Middle age	.790	.321	6.067*	.014	2.203
2	Old age	1.232	.417	8.722**	.003	3.428
3	Alcohol users	.577	.277	4.347*	.037	1.781
4	Noise exposure	.593	.223	7.066**	.008	1.810

* significant at 5 per cent level of probability

** significant at 1 per cent level of probability

[Variable(s) entered : stay_engine room, total stay in sea per month, SES_upper lower, SES_lower middle, fishing trip, middle age, old age, diabetes mellitus, smoker, education, alcohol, hypertension, personal protection from noise, noise exposure, boat mechanised.]

Table 34 shows that fishermen in 36- 55 year age group have 2.203 times higher odds of developing hearing impairment compared to 18- 35 year group. This odds further increased to 3.428 times in age group more than 55 years compared to the younger age group.

The individuals with alcohol consumption have 1.781 times higher odds of having hearing impairment when compared to non alcoholics.

The fishermen exposed to noise on board have 1.810 times higher log odds of developing hearing impairment when compared to population without noise

exposure. The coefficients for the other variables mentioned were not found to be statistically significant as per Wald statistic.

6.9.5 LOGISTIC REGRESSION MODEL FOR MUSCULOSKELETAL DISORDER

Table 35
Parameters significant for the Logistic Regression model for Musculoskeletal disorder

S.no	Variables	Estimated Coefficient	Standard Error	Wald Statistic	Sig	Exp (B)
1	Old age	1.171	.389	9.073**	.003	3.226
2	Education	-.453	.230	3.886*	.049	.635
3	hypertension	-.476	.224	4.505*	.034	.622

* significant at 5 per cent level of probability

**significant at 1 per cent level of probability

[Variable(s) entered : boat_mechanised, total stay in sea per month, SES_upper lower, SES_lower middle, obesity, fishing trip, old age, middle age, smoker, waist circumference, exercise, education, alcohol, hypertension, diabetes mellitus, occupational injury, repetitive job, alternate job]

Table 35 shows that the individuals above 55 years have 3.226 times higher odds of developing musculoskeletal disorder when compared to 18- 35 year age group. The odd was found to be statistically significant.

The log odds for fishermen with literacy decrease by 0.635 times compared to the illiterate fishermen.

The fishermen with hypertension have 0.622 times decrease log odds of developing MSD when compared to fishermen with normal blood pressure. The odds was found to be statistically significant.

Discussion

7. DISCUSSION

7.1 DEMOGRAPHIC CHARACTERISTICS OF STUDY POPULATION

The present study was a community based study conducted to estimate the prevalence of physical morbidity and the distribution of associated risk factors in fishermen. The present study was conducted in the fishermen population of Chennai district who were exclusively involved in offshore fishing. The study carried importance in the sense that fishermen are a large section of the population of the country and their physical morbidity may directly or indirectly affect the nation's health and economy in the future.

The number of study participants was 519. This study was exclusively done on males. The age distribution of the studied population showed that the majority of the participants belonged to the middle aged group. The percentage of the study population below the age of 35 years was 20%. This probably indicated that the number of young person taking up fishing profession was slowly going down due to their improvement in education status and looking for good opportunities in not so hazardous other sectors. It was also seen that three fourth of the respondents informed that they would prefer their children to take jobs other than fishing. This probably summed up the hardship and nature of job they had to endure and the fewer dividends they got in return.

The adult literacy rate of fishermen in the current study was 69.2% which was more than the national average for literacy of 58% among fisherfolk, according to CMFRI census 2010. The average national literacy rate for males in general population was 82.14% (2010- 2011).[69] The study findings were similar to the

literacy rate of 73% seen in the study done by Ramachandran et al. in the coastal population of Chennai.

Irrespective of the hazardous nature of the job, majority of the fishermen were involved in full time fishing activity. Amutha et al.[70] 2012 concluded in the study on fishermen of Tuticorin that lack of awareness and viable alternate livelihood programme prevented them from having a better socioeconomic status. Majority of the fishermen were in nuclear family and lived in their own house. 97.5% of the fishermen learned the fishing knowledge and skills from their fathers and grandfathers and continued the generation of fishing activity. Unfortunately only one fourth of the study population did some of savings on their income each month and kept some social security to the family. This probably could be due to their poor money management and wasteful expenditure on smoking and alcohol.

In spite of fishing being major revenue generating sector in India and contributed to the substantial part of India's GDP, [71] yet the current study showed that the majority (79%) of the participant belonged to upper lower socioeconomic class according to modified Kuppuswamy socioeconomic status scale. This finding was similar to the study done by Palivela et al.[72] 2011 in the coastal region of Visakhapatnam, Andhra Pradesh. The study showed that the majority of the fishermen population of Visakhapatnam fell below poverty line, had low education and poor general health.

Overweight is a well known risk factor for hypertension, diabetes and stroke.[73] The prevalence of overweight and obesity in the fishermen population in the current study was 15.99% and 38.73% respectively. The study findings were less than the findings in the study by Pougnet et al. 2013 that reported a prevalence of 60.9%.

The probable reason for the difference in the prevalence of overweight was due to criteria applied for the BMI value for Asian population. A BMI value of ≥23 was considered to be overweight.

7.2 OCCUPATIONAL RISK CHARACTERISTICS

The present study showed that there was wide variation in the number of fishing trips made and the total number of days stayed in sea per month by the fishermen population. This probably had led to the exposure of risk factors in fishing occupation and health related morbidity in the group. The present study showed that nearly 40% of the fishermen preferred to return to shore daily after a fishing trip, and the rest of them were at work in sea spanning between 2 days to 15 days. The irregular job timing may lead to the absence of adequate rest and proper sleep, which in turn may make them susceptible to the physical morbidity. Gander et al. 2008 highlighted in the study on New Zealand fishermen population that 23% of days at sea, fishermen obtained less than 4 hours of sleep. Approximately 30% of the individuals did not take regular break from offshore fishing every month. Majority of the fishermen did not have their own boat for fishing. Hence had to depend on other boat owners for their livelihood which may lead to the possibility of exploitation.[72]

Due to the process of globalisation, technical advancement through ages and provision of subsidiary schemes by the respective government, most of fishermen have taken to mechanised and engine driven boats. The present study also showed that three-fourth of the fishermen took to mechanised boat than hand driven boat. Amutha et al. 2012 in the study on the socioeconomic development of the fishermen of Tuticorin pointed out that there was a dramatic reduction of traditional fishing

(artisanal) from 37% in 2010 to 8% in 2012. The findings were consistent with the present study. The study also revealed that the average monthly family income of fishermen population was Rs 4000- 6000. The occupational risk factors include irregular working hours, extended hours of work depending on the yield of fish catch, extreme weather, poor working condition, exposure to constant noise and radiant heat of the sun, injuries while on boat at work, all contribute to the health morbidity in fishermen.

The risk factor of smoking and alcohol consumption on the health related morbidity was evaluated in the current study. The total prevalence of currently smoking tobacco in the population was found to be 34.30% which was nearly fifty percent lesser than the study done by Amit Bhondve et al. 2011 in Mumbai fishermen group. The reason for the difference could be because the present study only counted fishermen who currently had the habit of smoking tobacco and other form of intake of tobacco was ignored. The prevalence of alcohol consumption in the present study was 71.68%, which was nearly the same as the study done by Amit Bhondve et al. 2011 which had found the prevalence to be 63.4%. This could probably prove that the behaviour towards alcoholism was universally same in the fishermen population and it. Frantzeskou et al. 2014 by the review of literature done on the fishermen of Greece and Scotland reported that the prevalence of smoking tobacco was 38% among Scottish fishermen and 40% prevalence among Greek fishermen. With regard to the alcohol prevalence among fishermen, the review showed that there was 80% prevalence of alcohol consumption among Scottish fishermen group and 78% prevalence among the Greek fishermen. Universally it was found that there were more alcohol users in the fishermen population than smokers. Sandhya GI et al. 2013 showed that the prevalence of smoking among fishermen of Kerala was 20.7%.

The percentage of fishermen found to have never performed any kind of exercise outside work was 85.55%, which was nearly similar to the study done by Frantzeskou et al. 2012 in fishermen of Greece where it showed 66% of the fishermen had no exercise other than their work. This could probably explain some of the reasons for the increase in waist circumference and BMI among fishermen over a period of time. The result of the study done by Begossi et al. 2013 on the fishermen of coastal areas of Brazil revealed that 72% of the population did not do exercise beyond fishing.

7.3 PREVALENCE OF PHYSICAL MORBIDITY

This present study had shown that 25.58% of the fishermen population above age of 18 year was suffering from one or more than one type of chronic diseases. The most common morbidity detected by the present study was hypertension, which was consistent with the study done by Sandhya et al. 2013 that showed that 18.7 % of the coastal population above age 20 year was suffering from one or more than one type of chronic diseases and hypertension was the most common morbidity detected.

Pougnet et al. 2013, reviewed the literature on the prevalence of cardiovascular risk factors among fishermen between the year 1990 and 2000 and reported that the prevalence for hypertension among fishermen was 30.1% and for diabetes it was found to be 3.6%. The prevalence of hypertension and diabetes in the current study was 46.6% and 12.72% respectively. The probable reason could be due to the geographical distribution of the fishermen population, genetic susceptibility of different population to the disease onset and the time trend of increase in non communicable diseases throughout the world. Sandhya et al. 2013, in the study done on fishermen of the coastal region of Thiruvananthapuram, Kerala found the overall

prevalence of hypertension among the male population was 5.6% and that of Diabetes Mellitus was 4.4%. The difference in the findings could be because the current study tried to actively find the prevalence through physical and biochemical methods whereas the above study relied on the history of past diagnosis.

In this study the most prevalent health morbidity found in the fishermen were hypertension followed by musculoskeletal problems, hearing impairment, visual impairment and diabetes mellitus.

7.4 HYPERTENSION

The results of the present study revealed that the fishermen had a higher frequency of different health related morbidity. Nearly half of the studied population suffered from high blood pressure. The hypertension prevalence of 46.6% in the present study nearly matched with the study done by Ramachandran et al. 2006 on the coastal population of Chennai that showed a prevalence of 40%. According to Shankarappa M Mudgal , Srinivas Kosgi et al. 2010 the prevalence of hypertension in fisherman community of Mangalore was 4.4%. Study by Gupta et al. in urban population which adopted blood pressure 140/90 mmHg as defining criteria for hypertension, showed prevalence rate 30.[74] Study by Mandal et al. in urban population which adopted blood pressure 140/90 mmHg as defining criteria for hypertension, showed prevalence rate 49.41.[75] The difference in the finding probably could be attributed to the study population. The reason for the high prevalence of hypertension in the present study population probably could be attributed to exclusive male group and selection of fishermen who mainly do offshore fishing. The previous study included both males and females. In comparison, the study done by Anchala et al. 2014 reported the prevalence of hypertension in general population in rural south

India was 21.1% (20.1-22.0) and urban south India was 31.8% (30.4-33.1). The present study showed that the probability of the fishermen population developing hypertension was far greater than the general population.

The mean SBP and DBP of the fishermen population in the current study was 127.40 (σ=21.845) mmHg and 84.26 (σ=14.162) mmHg respectively. The study findings were consistent with the study done by Sambasiva Rao et al. 2007 where it found the mean SPB and DBP to be 124.25 (σ=7.83) mmHg and 82.59 (σ=6.15) mmHg respectively.

7.4.1 PREVALENCE OF RISK FACTOR ASSOCIATED WITH HYPERTENSION

Age was a significant risk factor for hypertension in the current study. The current study showed an increase in the proportion of hypertensive individuals (29.03%, 50%, 62.69%) with increasing age groups (18-35, 36-55, >55 years). This was consistent with the study done by Rao et al. 2013, on the adult population of coastal region of Karnataka.[76] The study revealed a similar pattern of prevalence of high blood pressure consistent with increasing age.

The present study showed a significant association between the types of boat used for fishing and prevalence of hypertension among the group. This probably could be due to the decrease in the physical activity for mechanised boats and psychosocial stress associated with prolonged stay in sea during each trip.

Both body mass index (BMI) and abdominal adiposity showed a significant associated risk factor for hypertension which was consistent with the study done by Gopi Chand et al. 2007 in the coastal fishermen's urban slum of Visakhapatnam. The study showed that the regression coefficient for the BMI with the blood pressure was

positive which was statistically significant. There was a significant increase in the prevalence of hypertension with increasing BMI.

This study showed a significant association between the duration of alcohol use and prevalence of hypertension although smoking was not found to have significant association. This could probably be due to the study methodology where only the current smokers were included. The increased duration of alcohol consumption probably led to an increase in the adiposity of the body and psychosocial stress.

On the other hand this study did not find any significant association between the risk factors of fishing trips, socioeconomic status, number of working days in a month, family history of hypertension, fruits and vegetables and fried fish consumption with prevalence of hypertension.

7.5 PREVALENCE OF DIABETES MELLITUS

In the current study the prevalence of diabetes among the fishermen population was 12.72 per cent which was similar to the findings obtained by the study done by Ramachandran et al. 2006 in the fishermen of coastal areas of Chennai that showed a prevalence of 10%. In contrast, the prevalence in the general population in urban area according to Menon et al. 2005 showed that it was 19.5% for diabetes and 4.1% for the impaired glucose tolerance.

In this study the impaired glucose tolerance was found in 9.20 per cent of the total. This finding was similar to the study done by Ramachandran et al. 2006 that showed a prevalence of IGT as 8.3%. The prevalence of IGT in the current study was higher than that found in Menon et al. study on urban population which indicates that fishermen are at increased risk to develop diabetes mellitus if left uncared for. This identification could facilitate early institution of dietary, lifestyle modification and

periodic monitoring of blood glucose levels to prevent or delay progression to diabetes in this group. WHO 2008b report had documented that the prevalence of IGT in American Samao was 47.3% and Cook Island was 23.7%.

7.5.1 PREVALENCE OF RISK FACTOR ASSOCIATED WITH DIABETES MELLITUS

Mithun das et al.[77] 2009-2010 had shown that Individuals with a history of both parents affected from diabetes had significantly higher (P<0.001) fasting blood glucose (FBG; P=0.035) than individuals having no family history of type 2 diabetes mellitus. He concluded that family history of type 2 diabetes mellitus had significant effect on individuals with metabolic syndrome as compared to their counterparts (individuals having no family history of type 2 diabetes mellitus). The present study also has shown that there was an increased incidence of diabetes in individuals having positive family history of diabetes, which was statistically significant.

Approximately three out of hundred fishermen were not aware that they had diabetes mellitus in this study. World Health Report 2008 (a) had stated that diabetes had become a major public health issue in Western Pacific region. The study done on the fishing community of American Samao found that Diabetes correlated positively with a number of risk factors including abdominal obesity, hypertension. These risk factors are associated with unhealthy lifestyles and behaviors such as smoking, diets high in saturated fat and salt, and lack of physical activity.

Patel et al. 1993-1997 did a cohort study on the association between dietary fish consumption and incidence of type 2 diabetes found that higher total fish intake (one or more versus less than one portions/week) was associated with a significantly lower risk of diabetes (odds ratio [OR] 0.75 [95% CI 0.58-0.96]). The current study

did not find a significant association between fried fish consumption and incidence of diabetes mellitus.

7.6 PREVALENCE OF VISUAL IMPAIRMENT

Visual impairment is a global public health issue. Cataract and uncorrected refractive error are the two most common cause of visual impairment in India.[78] The present study showed that with increase in age of the participants, there was increase in visual impairment and nearly 50% of visual impairment was above the age of 55years. The overall prevalence of visual impairment was 20.8% which was found to be less than the study done by Srinivas Marmamula et al. 2011 which showed the prevalence of visual impairment in South Indian fishing community to be 30% (95% CI, 27.6-32.2). In the study done by Patil et al. 2014 in the Konkan coast of India among subjects aged more than 50 years found the prevalence of visual impairment as 33.8% (30.5%-36.8%), which was lesser than the prevalence value of 50.75% in the present study in the same age group. The probable reason for the difference could be the former study included both males and females as the subjects and the difference in the prevalence of risk factors. In contrast, WHO [79] estimated that 285 million people are visually impaired across the globe and out of which nearly 90% live in low income countries. The prevalence of visual impairment in general population above the age of 40 years done in the rural south Indian population as shown by Thulasiraj et al. 2003 in the study was 4.3% which was lesser than the prevalence of 26.33% found in the present study in the same age group. The reason for the difference could be the occupational risk associated with fishing and exclusive male subjects included in the present study.

7.6.1 PREVALENCE OF RISK FACTOR ASSOCIATED WITH VISUAL IMPAIRMENT

This study also showed that fishermen who used mechanised boats had more prevalence of visual impairment. There was also significant association of duration of fishing trips and presence of visual impairment. This was consistent with the study done by Burke et al.[80] who reported that the risk of skin and eye damage was very high due to sun exposure which was significantly higher at sea than on land because of the unhindered reflection of sunlight.

Wilson GA et al. estimated the burden of visual impairment attributable to smoking in New Zealand through Review of Medline-indexed literature, found that smoking is a major cause of untreatable visual impairment. In the present study the association of smoking with visual loss was not found to be significant. But duration of alcoholism in fishermen population of more than 20 years had increased prevalence of visual impairment with nearly one third developing visual impairment. Participant belonging to lower socioeconomic status had more chance of having visual problem probably due to their hazardous nature of fishing, nutrition deficiency and lack of early screening initiative.

There was a statistical significant association between BMI and visual loss with participant with normal body mass index showed more prevalence of visual loss. The duration of sun exposure of more than 4 hours had increased prevalence of visual loss in study population which was found to be statistically significant. The use of PPE, fruits and vegetable intake, total working days per month in sea showed insignificant risk factor for visual impairment.

7.7 PREVALENCE OF HEARING IMPAIRMENT

Hearing is a very essential sensory function for good communication and economic productivity. According to WHO, hearing impairment is the most common sensory deficit and second leading cause for years lived with disability. World Health Organisation defined hearing loss as "Any person who is not able to hear as well as someone with normal hearing with hearing thresholds of 25dB or better in both ears. In 2012, WHO estimated the prevalence of hearing loss to be 5.3% of global population and 6.3% in Indian population.[81]

The present study found the prevalence of hearing impairment in 22.40% of the total individuals which was less than the study done by Mahmoud El-Saied El-Saadawy et al. 2011 who had reported the prevalence of hearing impairment in fishermen to be 37.90% of the total. The reason for the difference could be due to the methodology of the study and the tools used to measure hearing loss. The former study relied on the subjective response to the questions on auditory impairment. The study done by Madhanraj et al. 2013 showed the prevalence of hearing impairment in coastal population of Tamil Nadu as 8.5%. The difference in prevalence could be due to the sociodemographic variation of the population and the inclusion of both the sex in the study. In comparison, the global prevalence of hearing impairment according to the review of studies done by Gretchen Stevens et al. 2013 reported as 12.2% in males >15 years which was seen to be half of the prevalence from the current study. This probably indicated that fishermen were a high risk group for hearing impairment. Mishra et al. 2011 studied the prevalence of hearing impairment in general population of Lucknow in India and showed that the prevalence was 15.14% in the rural areas and 5.9% in the urban population.

7.7.1 PREVALENCE OF RISK FACTOR ASSOCIATED WITH HEARING IMPAIRMENT

This study showed that the age was a significant risk factor for hearing problems. The current study showed that 87% of the prevalence of hearing impairment was seen in age above 35 years which was similar to the findings by Betes et al. 2011 which showed a prevalence of 96.8% in fishermen population above the age of 40 years. The study done by Madhanraj et al. 2013 found that nearly 60% of the participants above the age of 40 years had hearing impairment. With increasing age, there was an increase in incidence of hearing impairment.

The noise level on board in sea in the present study was also found to be significant risk factor for hearing loss, which was similar to the study done by Harris et al.[82] who stated that fishermen complained of health problems related to noise exposure as a result of long periods of staying near the machines in the vessel. The type of boat, fishing trips, duration of stay in sea, PPE against noise was found to be insignificant risk factor for hearing loss.

The greater the duration of alcohol use, greater was the prevalence of hearing impairment which was statistically significant. This present study did not show any significant association between current smoking and hearing impairment.

7.8 PREVALENCE OF MUSCULOSKELETAL DISORDERS

In this study the second most prevalent health morbidity was musculoskeletal problems. One in four subjects suffered from musculoskeletal problems. These findings were consistent with the study done by Kaerlev et al.[83] who reported that the work environment of seas had a number of special and different risks leading to severe health hazards in fishermen especially MSD and stress**.** Lawrie et al.[58] found

that back injuries were the most common reported occupational injuries at sea, and those with falls were more likely to have musculoskeletal problems.

The study done by Mahmoud El-Saied El-Saadawy et al. 2011 found that 91% of the fishermen had history of musculoskeletal pain, which was far greater than the current study which showed a prevalence of 25.40%.

Punnett et al. 2005 estimated the global prevalence of low back pain attributable to combined occupational exposures and documented that 37% of all working population suffered from low back pain. The prevalence was more among men than women probably due to the nature of work.

7.8.1 PREVALENCE OF RISK FACTOR ASSOCIATED WITH MUSCULOSKELETAL DISORDER

The frequency of musculoskeletal disorders was seen more in fishermen who used mechanised boat than unmechanised boat. This finding was similar to the study done by Kucera et al. 2010 on the commercial fishermen of North Carolina. The probable reason could be the presence of large crew members and prolonged stay at sea.

The extremes of years of fishing <10years and more than 20 years showed increase proportion of people with MSD. Current smokers, fishing on others boat showed an increased incidence of MSD. These findings were similar to the study done by Kucera et al. 2010 the present study observed an increased incidence of MSD with current alcohol consumption

Although musculoskeletal problems were more seen in middle age group, it was not significantly associated. Neither did the type of boats used, number of fishing trips, duration of stay in sea, education levels, socioeconomic status of the individuals made significant association with musculoskeletal problems in the individuals in this study.

The study on fishermen done by Kaerlev et al. had shown that the prevalence of musculoskeletal complaints was 38.5%. This difference could be due to the type of deep sea fishing, mechanism of fish catching and socio demographic difference in the population.

The association between hearing impairment and musculoskeletal problems was found to be statistically significant. Nearly one third of individuals with hearing impairment had MSD. This could probably due poor coordination among fishing crews while lifting weights or other activities due to hard of hearing in the individuals.

The prevalence of occupational injury in the present study was 24.50% which was similar to the study done by Elpida Frantzeskou et al. 2012 that showed 28% prevalence of occupational related injuries in fishermen population. Nearly ¼ th of the population suffered occupational related injury in any part of time. The current study observed that the prevalence of occupational injury was more in younger population probably due to their inexperience in fishing and the ability to take greater risk in sea. Nearly 30% of the people belonging to age group of 18-35 yrs met with some of accidents while working in sea. This study found that occupational injury was more common in population of fishing experience between 10-20yrs which was statistically significant.

The study observed that increased proportion of individuals with occupational injury had developed MSD. 32.28% of individuals with occupational injury had developed MSD which was found to be statistically significant. The number of persons involved in repetitive jobs had more musculoskeletal problems but it was not statistically significant.

Summary and Conclusion

8. SUMMARY

The current study was a cross sectional study carried out among 519 fishermen of age more than 18 years to assess the prevalence of physical morbidity in the population and its associated risk factors in coastal areas of Chennai District.

The study was carried out using a pretested semi structured questionnaire and a set of tools and instruments to measure the physical parameters in the sample population and expressed the result using chi square test.

The major findings of the study were as follows:

- The study showed that the illiteracy rate in fishermen was high and most of them belonged to lower socioeconomic status. The lack of social security made them vulnerable to health related expenditure. The fishermen were involved in heavy physical activities like deep sea fishing which made them expose to lots of risk factors. The number of fishing trips and total number of working days per month varied among the sample population which made them socially isolated, mentally stressful and physically tiring.
- With regard to diet, fruits and vegetable consumption was very poor. The consumption of fried fish and salted dried fish was high, which could cause a negative impact on their cardiovascular system.
- The fishermen population showed a prevalence of 46.6% for hypertension, 25.40% for musculoskeletal disorders, 22.40% for hearing impairment, 20.80% for visual impairment and 12.72% for Diabetes Mellitus.
- The prevalence of hypertension and diabetes was higher than the general population. There was striking lack of awareness of diabetes mellitus and elevated blood pressure among affected study population. Among the total

hypertensive, only 13.64% were aware of their condition. Among the Diabetic population, nearly one-fifth of the individuals were not aware of their condition. There was high proportion of the population with visual and hearing impairment, who had never approached any health personnel for their health condition.

- Most of the physical morbidity studied here showed an increasing trend with age. There was a significant association of age with the physical morbidity.
- The high prevalence of overweight and obesity in the study population due to their food habits, lack of exercise outside of work and the technical modification brought about in the fishing activity over the time period, need to be addressed. The present study supports the association of obesity with hypertension and diabetes mellitus.
- The higher prevalence of abdominal obesity (high WC) in the population increased the chance of cardiovascular risk among the fishermen.
- Occupational exposure to sunlight and noise without proper personal protective equipments against them increased the risk of visual and hearing impairment in the sample population.
- The higher prevalence of hearing and visual impairment suggests the need for organised programme and training in hearing and visual rehabilitation.
- The nature and intensity of fishing jobs, risk of occupational injury and the presence of other physical morbidity made the fishermen vulnerable for musculoskeletal disorders. MSD was the second most common morbidity seen in the study which called for a increased attention on the ergonomic aspect of workforce and the availability of occupational health services for screening, early detection and treatment of such conditions.

- The obtained results could turn the attention towards fishermen health because of the magnitude of the condition and the avoidable nature of the physical morbidity and their risk factors. It would also mean that the fishermen health is of prime importance as they ensure the food security to all.

Limitations

9. LIMITATIONS

1. Since this study was a community based study, audiometric evaluation for hearing loss was not feasible. The sensitivity of tuning fork to detect hearing loss was less than the audiometric method.[84] Hence the prevalence of hearing impairment found in this study could be an underestimate and should be interpreted with caution.

2. The noise level at the boat could not be quantified in order to determine the cut off value for noise level causing hearing loss in fishermen, due to financial and feasibility concern.

3. The present study only identified people with distant vision loss. Near vision loss could not be measured due to time constraints. Ideally both need to be measured in order to provide a true estimate of the disability due visual loss in the study population.

4. Ideally the Post prandial blood sugar test must have been done by giving 75 grams of anhydrous glucose dissolved in water and then taken the 2 hours blood glucose level. In this study the test was done 2 hours after the participants had their food because of the feasibility problem in this community based study. Hence the results may not be a true estimate of the diabetic prevalence in the fishermen population.

5. This study being a descriptive cross sectional study of the morbidity and their associated risk factors, hence could not establish the causal association.

6. The work task of fishermen and the ergonomic assessment on board associated with musculoskeletal disorders could not be quantified based on the weights lifted or degree of activity done by them because of technical issues.

Recommendations

10. RECOMMENDATIONS

Based on the outcome of the present study, the following recommendations are being put forth.

1. The fishermen population once believed to be immune to certain diseases seen in general population like obesity, diabetes mellitus, are now through the ages are showing increase prevalence of the same disease. This calls for active screening programmes for the fishermen population and to reach out to them in order to avoid a huge social and economic burden to the population and the country.
2. There are various modifiable factors associated with the physical morbidity in the population; therefore emphasis must be put on the lifestyle factors like diet, smoking cessation, alcohol restriction and physical activity.
3. Awareness about the non communicable diseases like diabetes mellitus and hypertension are lacking among the fishermen group, hence it recommended to provide information and generate awareness about them through the various agency of the government and with the involvement of the self help groups.
4. Health education intervention must be instituted among the fishermen especially the younger generation, in order to avoid the morbidity due to the diseases in this study.
5. The excessive prevalence of alcohol consumption in the fishermen population must be controlled through the use of effective behavioural change communication method. Awareness about safe drinking levels and legislation to ban smoking in the vessel could help bring down the incidence of cardiovascular risk factor like hypertension and obesity.

6. Emphasis must be laid on the use of personal protective equipments by the fishermen during work as exposure to noise in the boat was significantly associated with hearing impairment.

7. A regular vision screening programme must be conducted among the fishermen group in order to detect early visual loss and suggest treatment as the prevalence of uncorrected visual impairment was found to be very high in this study.

8. The occupational health services must be strengthened in order to help the fishermen identify their diseases early and improve the health seeking behaviour of the population.

9. The musculoskeletal disorder was the second most common morbidity found in this study. Therefore a proper ergonomic technique, provision of new technology to ease the job of lifting heavy weights and regular screening programme is absolutely necessary to decrease the prevalence of MSD among the studied population.

10. There is a need for more longitudinal studies to be done in the fishermen population to assess the effect of these risk factors on the physical morbidity.

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Annexures

ANNEXURE 1

PATIENT INFORMATION SHEET- ENGLISH

Investigator: Dr. Gopal. M
Name of Participant:
Title of the study:

"A CROSS SECTIONAL STUDY OF THE PHYSICAL MORBIDITY AND THEIR RISK FACTORS IN FISHERMEN OF CHENNAI DISTRICT, 2014"

You are invited to take part in this study. The information in this document is meant to help you decide whether or not to take part. Please feel free to ask if you have any queries or concerns.

The work of the sea fishermen is one of the most hazardous occupations. Fishermen community as such is susceptible to both communicable and non communicable diseases due to their occupation and socio-demographic characteristic. The various risk factor associated with the profession and due to the behaviour characteristics of the fishermen community exposes these group to lots of health morbidity. We want to find out about the common physical health problems faced by fishermen who go to the sea for fishing. This study is an attempt to estimate the prevalence of physical morbidity and also estimate the prevalence of their risk factor in fishermen of Chennai district, Chennai.

The procedure of this research study is that you will be invited to participate in an interview with me or my colleague that will last for about 30 minutes. You have been selected at random and your responses are very important to us and the community, as these answers will represent many other persons. During the interview, I or another interviewer will sit down with you in a comfortable place to ask you a set of questions regarding the research objective. If you do not wish to answer any of the questions during the interview, you may say so and the interviewer will move on to the next question. The information recorded is confidential. You will also be requested to give a blood sample for investigation as a part of this research study. The privacy of the participants in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

Your participation in this research is entirely voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.

The results of the special study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

PATIENT INFORMATION SHEET- TAMIL

விசாரணையாளர் : **மரு. மு.கோபால், MD**

பங்கேற்பாளர் பெயர் :

ஆய்வு தலைப்பு : **சென்னை மாவட்டத்தின் மீனவர்களின் நோயுறும் தன்மை மற்றும் ஆபத்து காரணிகளை கண்டறியும் குறுக்கு வெட்டு ஆய்வு**

உங்களை இந்த ஆய்வில் பங்கேற்க நாங்கள் அழைக்கின்றோம். இந்த ஆவணத்தில் உள்ள தகவல்களாக நீங்கள் இந்த ஆராய்ச்சியில் பங்கேற்பதைப் பற்றி முடிவு செய்ய உதவும். உங்களுக்கு ஏதேனும் கேள்விகள் அல்லது கவலைகள் இருந்தால் கேட்டு தெரிந்து கொள்ளுங்கள்.

கடல் மீனவர்களின் வேலை மிகவும் ஆபத்தான தொழிலாகும். தங்கள் தொழில் மற்றும் சமூக மக்கள் பண்பு காரணமாக மீனவர் சமுதாயம், தொற்று நோய் மற்றும் இதர நோய்கள் தாக்கும் அபாயம் உள்ளனர். மீன்படி தொழில் உள்ள பல்வேறு காரணிகளாலும் மற்றும் நடத்தை பண்புகளாலும் பல்வேறு நோயுற்ற நிலைக்கு மீனவர் சமுதாயம் தள்ளப்படுகிறது. இந்த ஆய்வு ராயபுரம் மீனவர் சமுதாயத்தின் நோயுற்ற பாதிப்பு மற்றும் அதன் காரணிகளை மதிப்பிட ஒரு முயற்சி ஆகும்.

இந்த ஆய்வின் செயல்முறை என்னவென்றால் நீங்கள் என்னிடமோ அல்லது என் சக மருத்துவ நண்பரிடமோ சுமார் 30 நிமிடம் பேட்டியில் பங்கேற்க அழைக்கப்படுவீர்கள். நீங்கள் தேர்வு முறையில் தேர்ந்தெடுக்கப்பட்டுள்ளீர்கள். நீங்கள் எங்களுக்கு அளிக்கும் பதில் சக மக்களை பிரதிபலிக்கும். ஆகையால் நீங்கள் தரும் பதில்கள் எங்களுக்கும் மற்றும் சமுதாயத்திற்கும் மிகவும் முக்கியமானவை. பேட்டியின் போது நான் அல்லது மற்ற பேட்டியாளர் உங்களுடன் அமர்ந்து கொண்டு எங்கள் ஆராய்ச்சியின் நோக்கம் குறித்து ஒரு கேள்வி தொகுப்பினை கேட்போம்.

நீங்கள் பேட்டியின் போது எந்த கேள்விக்காவது பதில் அளிக்க விருப்பம் இல்லை என்றால் அவ்வாறே கூறலாம் மற்றும் பேட்டியாளர் அடுத்த கேள்விக்கு சென்று விடுவார். நீங்கள் அளிக்கும் தகவல்கள் ரகசியமாக வைத்து கொள்ளப்படும். இந்த ஆய்வில் ரத்த பரிசோதனைக்காக நீங்கள் சிறிது அளவு ரத்தம் கொடுக்க வேண்டுகோள் வைப்போம்.

இந்த ஆராய்ச்சியில் பங்கேற்பாளர்களின் தனி உரிமை முழுவதுமாக பாதுகாக்கப்டும். இந்த ஆராய்ச்சியின் விளைவாக எந்த வெளியீடு அல்லது வழங்கல் நிகழ்வின் போது எந்த தனிப்பட்ட முறையில் அடையாளம் காணக்கூடிய தகவல் பகிர்ந்து கொள்ளப்படமாட்டாது.

இந்த ஆய்வில் பங்கேற்பது முற்றிலுமாக உங்கள் விருப்பத்தில் உள்ளது. இந்த ஆய்வில் பங்கேற்பதோ அல்லது எந்த நேரத்திலும் விலகிக் செல்லுவதற்கும் உங்களுக்கு முழு உரிமை இருக்கிறது.

நீங்கள் எடுக்கும் முடிவுகளால் எந்த விதத்திலும் உங்களுக்கு சேரும் நன்மைகள் குறைக்கப்பட மாட்டாது. இந்த ஆய்வின் முடிவுகளை ஆய்வு முடிந்த பிறகு அல்லது ஏதேனும் அசாதாரணம் கண்டுபிடித்தால் ஆய்வின் போது தெரிவிக்கப்படும்.

ANNEXURE- II

INFORMED CONSENT FORM- ENGLISH

READ TO THE SELECTED RESPONDENT:

I am Dr.M.Gopal presently doing my MD postgraduate training in the Institute of Community Medicine, Madras Medical College, Chennai. As a part of my dissertation work towards the fulfillment of the MD community medicine course curriculum of Tamil Nadu Dr.M.G.R Medical University, I am collecting information about the physical morbidity and their risk factors in fishermen of Chennai district. This information will be used for public health purposes.

You have been selected at random. Your responses are very important to us and the community, as these answers will represent many other persons. The interview will last around 30 minutes. If you agree to be in this study, we will collect single blood sample from you. You will be seated and 2ml of blood will be drawn by putting a needle into a vein in your arm. This will take about five minutes. Your participation in this survey is entirely voluntary. The information that you will provide us will be kept strictly confidential, and you will not be identified by your responses. Personal information will not be shared with anyone else, not even to the other family members. You can withdraw from the study at any time, and may refuse to answer any question.

We will leave the necessary contact information with you. If you have any questions about this study, you can contact the researcher.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study and also for giving of blood sample for investigation.

Name of Participant_____ Signature of the participant_____

Signature of investigator _____ Date _____

INFORMED CONSENT FORM- TAMIL

பங்கேற்பவரிடம் படித்து காண்பிக்கவும்

நான் மரு. கோபால், தற்போது சமூக நல உயர் மருத்துவ துறையில், சென்னை மருத்துவ கல்லூரியில் MD முதுகலை பட்டதாரியாக பயிற்சி செய்து வருகிறேன். தமிழ்நாடு Dr. MGR மருத்துவ பல்கலை கழகத்தில் MD சமூக மருத்துவம் பாடதிட்டத்தில் பூர்த்தில் நோக்கில் என் ஆய்வு பணியில் ஒரு பகுதியாக நான் சென்னை மாவட்டத்தின் மீனவர்களின் உடல் நோயுறும் மற்றும் அவர்களின் ஆபத்து காரணிகள் பற்றிய தகவல்களை சேகரிது வருகிறேன்.

இந்த தகவல்கள் பொது சுகாதார தேவைகளுக்காக பயன்படுத்தலாம். அதாவது உங்கள் வீடு மற்றும் நீங்கள் தேர்வு முறையில் தேர்ந்தெடுக்கப்பட்டு உள்ளீர்கள்.

நீங்கள் தரும் பதில் பல்வேறு மக்களை பிரிதிபலிக்கும். ஆகையால் நீங்கள் தரும் பதில்கள் எங்களுக்கும் மற்றும் சமுதாயத்திற்கு மிகவும் முக்கியமானவை. இந்த பேட்டி சுமார் 30 நிமிடங்கள் நீடிக்கும்.

நீங்கள் இந்த ஆய்விற்கு விருப்பம் தெரிவித்தால் நாங்கள் ஒருமுறை உங்களிடம் இருந்து இரத்த பரிசோதனைக்காக ரத்தம் சேகரிப்போம். உங்களை அமர செய்து உங்களிடம் இருந்து ஒரு ஊசி மூலமாக உங்கள் கையின் ரத்த குழாய் வழியாக 2மி.லி. ரத்தம் எடுக்கப்படும். இதற்காக சுமார் ஐந்து நிமிடங்கள் தேவைப்படும்.

இந்த ஆய்வில் உங்கள் பங்களிப்பு முற்றிலுமாக உங்கள் விருப்பத்தை சார்ந்தது. நீங்கள் எங்களுக்கு வழங்கும் தகவல்கள் ரகசியமாக வைக்கப்படும் மற்றும் நீங்கள் உங்கள் பதில்களால் அடையாளம் காணப்பட மாட்டீர்கள்.

உங்கள் சொந்த தகவல்கள், உங்கள் குடும்பத்தினரோடு அல்லது வேறு யாரிடமும் பகிர்ந்து கொள்ளப்படமாட்டாது. நீங்கள் எந்த நேரத்திலும் இந்த ஆய்விலிருந்து வெளியேற முடியும் மற்றும் எந்த கேள்விக்கு பதில் அளிக்காமல் மறுக்க முடியும்.

நாங்கள் உங்களுக்கு தேவையான தகவல்களை விட்டு செல்கிறோம். இந்த ஆய்வு பற்றிய ஏதேனும் கேள்விகள் இருந்தால் நீங்கள் ஆராய்ச்சியாளரை தொடர்பு கொள்ளலாம்.

நான் மேற்கூறிய தகவல்களை படித்து புரிந்துக்கொண்டேன் அல்லது எனக்காக அதை படித்து காண்பிக்கப்பட்டது. இதை குறித்து கேள்விகளை கேட்க வாய்ப்பு கொடுக்கப்பட்டுள்ளது மற்றும் நான் கேட்ட கேள்விக்கு என் திருப்திக்கேற்ப பதில் கூறப்பட்டுள்ளது. நான் என் சொந்த விருப்பத்தில் இந்த ஆராய்ச்சியில் பங்கேற்பதற்கும் மற்றும் பரிசோதனைக்காக ரத்தம் அளிப்பதற்கும் ஒப்புதல் தெரிவிக்கிறேன்.

பங்கேற்பாளரின் பெயர் : பங்கேற்பாளரின் கையொப்பம்

ஆய்வாளரின் கையொப்பம்: தேதி :

ANNEXURE- III

QUESTIONNAIRE- ENGLISH

A CROSS SECTIONAL STUDY OF THE PHYSICAL MORBIDITY AND THEIR RISK FACTORS IN FISHERMEN OF CHENNAI DISTRICT, CHENNAI, 2014

SECTION A –DEMOGRAPHIC DETAILS: **No.**

1. Name	
2. Age (in completed years)	
3. Education	☐ 1.Illiterate ☐ 2.Primary ☐ 3.Secondary ☐ 4.Higher Secondary ☐ 5.College ☐ 6.Others
4. Marital status	☐ 1.Un married ☐ 2.Married ☐ 3.Separated ☐ 4.Divorced ☐ 5. widower
5. Any other occupation apart from fishing	
6. Total members in your family	
7. Number of family members under your economic responsibility	
8. Type of House	☐ 1.Own house ☐ 2.Rented house
9. What is the reason for choosing fishing as your income source?	
10. Are you willing to make your children take up fishing job?	☐ 1.Yes ☐ 0. No
11. How many members in your family are involved in fishing?	
12. What are the existing social security benefits you have?	
13. Fishing experience (years)	
14. Average monthly income from fishing?	
15. On an average in a month, what is the total family income?	

16. Do you have your own boat?	☐ 1.Yes ☐ 0. No
17. Type of boat used for fishing job?	☐ 1.Wooden sail boat ☐ 2.Diesel powered boat ☐ 3. both
18. When do you come back home after your fishing job?	☐ 1.Daily ☐ 2.Once in 2 to5 days ☐ 3.Once in 6to10 days ☐ 4.Once in 11to15 days ☐ 5. Cannot Say
19. On an average, in a month how many days do you stay in sea?	☐ 1. Less than a week ☐ 2. 1- 2 weeks ☐ 3. 2- 3 weeks ☐ 4. 3- 4 weeks

SECTION B – MORBIDITY DETAILS:

20. Have you ever been told that you have Diabetes by a doctor?	☐ 1.Yes ☐ 0. No
21. Have you ever been told that you have high blood pressure by a doctor?	☐ 1.Yes ☐ 0. No
22. In the past 2 years, did you suffer with cough daily for more than 3 months?	☐ 1.Yes ☐ 0. No
23. Do you have any difficulty in seeing?	☐ 1.Yes ☐ 0. No
24. Do you have any difficulty in hearing?	☐ 1.Yes ☐ 0. No
25. Are you suffering from back pain or joint pain??	☐ 1.Yes ☐ 0. No

SECTION C: RISK FACTOR DETAILS

26.Have any of your blood relatives been diagnosed with diabetes?	☐ 1.Yes ☐ 0. No
27. Have any of your blood relatives been diagnosed with high blood pressure?	☐ 1.Yes ☐ 0. No
28. What is the usual number of working hours spent outdoors in the fishing boat not under any shade between 9 am to 5pm?	
29. Do you wear personal protection from sunlight (like sun glasses, hat, sunscreen) during fishing in sea?	☐ 1.Yes ☐ 0. No

30.Where do you mostly be in the boat during work:	☐ 1.in the engine room ☐ 2.deck of the boat ☐ 3. Others……
31. Do you have to shout in order to be heard by others during the fishing job?	☐ 1.Yes ☐ 0. no
32. Do you wear personal protection from noise (like ear plug or ear muffs) during fishing in sea?	☐ 1.Yes ☐ 0. no
33. Do you involve more in repetitive work task (like lifting engines etc, lowering loads, pushing and pulling loads, carrying loads)?	☐ 1.Yes ☐ 0. No
34. In the past 1 year did you have any occupational Injuries like (open wound, injury with hook, bite by marine fauna, accidental fall into sea, fish bone insertion, fractures, amputation etc)?	☐ 1.Yes ☐ 0. No

SECTION D: PERSONAL HISTORY

35. Do you presently smoke tobacco?	☐ 1.Once in a day ☐ 2. Twice in a day ☐ 3. Thrice in a day ☐ 4.More than thrice a day ☐ 5.Never
36.If yes, how many years ago have you started smoking?	
37. Do you drink alcohol now	☐ 1.Every day ☐ 2. Weekly once ☐ 3.Weekly twice ☐ 4.Weekly thrice ☐ 5.More than thrice a week ☐ 6.Never
38. If yes, how many years ago have you started consuming alcohol?	
39.Do you exercise apart from your daily activities for more than 30 minutes?	☐ 1.Every day ☐ 2. Weekly once ☐ 3.Weekly twice ☐ 4.Weekly thrice ☐ 5.More than thrice a week ☐ 6.Never
40.On an average what is the quantity of salt does your family buy in a month?	kilograms
41.What type of oil does your family buy predominantly for cooking?	☐ 1.palm oil ☐ 2.coconut oil ☐ 3.refined oil ☐ 4. others

Q.no	Food items	Everyday	Weekly once	Weekly twice	Weekly thrice	More than thrice a week	never
42	Cooked Fish						
43	Fried fish						
44	Dry fish(karuvadu)						
45	Vegetables						
46	Fruits						
47	Snacks/packed foods						

SECTION – E: PHYSICAL EXAMINATION

48	Height	(cms)
49	Weight	(kg)
50	Waist circumference	(cms)
51	BMI	
52	Blood pressure	1st reading 2nd reading
53	Blood sugar (PPBS)	……mg/dl
54	Visual acuity (Snellen chart)	Right eye …….. Left eye ……
55	Hearing (Tuning Fork Test)	Right ear …… Left ear …….
56	Joint	Swelling……
57	Muscle	Movements (restricted/unrestricted)…….

QUESTIONNAIRE- TAMIL

சென்னை மாவட்டத்தின் மீனவர்களின் நோயுறும் தன்மை மற்றும் ஆபத்து காரணிகளை கண்டறியும் குறுக்குவெட்டு ஆய்வு - 2014

பிரிவு அ : பொது விபரங்கள் *No.*

1. பெயர்	
2. வயது	
3. கல்வி	☐ 1. படிக்காதவர் ☐ 2. ஆரம்ப பள்ளி ☐ 3. நடுநிலை பள்ளி ☐ 4. மேல்நிலை பள்ளி ☐ 5. கல்லூரி ☐ 6. மற்றவை
4. திருமண நிலை	☐ 1. திருமணமாகதவர் ☐ 2. திருமணமானவர் ☐ 3. பிரிந்து வாழ்பவர் ☐ 4. விவாகரத்து பெற்றவர் ☐ 5. மனைவியை இழந்தவர்
5. மீன் பிடிக்கும் தொழிலை தவிர்த்து வேறு ஏதும் தொழில் செய்கிறீர்களா?	☐ 1. ஆம் ☐ 2. இல்லை
6. உங்கள் குடுபத்திலுள்ள மொத்த நபர்களின் எண்ணிக்கை?	
7. உங்கள் வருவாயினைச் சார்ந்து வாழும் உங்கள் குடும்பத்திலுள்ள நபர்களின் எண்ணிக்கை?	
8. வீட்டின் வகை	☐ 1. சொந்த வீடு ☐ 2. வாடகை வீடு
9. உங்களது வருமானத்திற்கு முக்கிய தொழிலாக மீன் பிடிக்கும் தொழிலை தேர்வு செய்த காரணம்?	
10. நீங்கள் உங்கள் பிள்ளை மீன் பிடிக்கும் தொழிலை செய்வதில் விருப்பம் கொள்கிறிர்களா?	☐ 1. ஆம் ☐ 2. இல்லை
11. உங்கள் குடும்பத்திலுள்ள மீன்பிடிக்கும் தொழில் செய்பவர்களின் எண்ணிக்கை?	
12. உங்கள் சமூக பாதுகாப்பு நலன் கருதி நீங்கள் செய்துள்ள சேமிப்பு திட்டங்கள் ஏதேனும் உண்டா?	☐ 1. ஆம் ☐ 2. இல்லை

13. மீன் பிடிக்கும் தொழில் அனுபவம் (வருடங்களில்)	
14. மீன் பிடிக்கும் தொழில் மூலம் கிடைக்கும் சராசரி மாத வருமானம்?	
15. சராசரியாக ஒரு மாதத்திற்கு உங்கள் குடும்பத்தின் மொத்த வருமானம்?	
16. நீங்கள் சொந்தமாக படகு வைத்துள்ளிர்களா?	☐ 1. ஆம் ☐ 2. இல்லை
17. நீங்கள் எந்த வகையான படகினை மீன் பிடிக்க பயன்படுத்துகிரீர்கள்?	☐ 1. மர விசைப் படகு ☐ 2. இயந்திரப் படகு
18. நீங்கள் மீன் பிடிக்கும் தொழிலைச் செய்து விட்டு வீட்டிற்கு எப்பொழுது திரும்புவிர்கள்?	☐ 1. தினமும் ☐ 2. இரண்டு முதல் ஐந்து நாட்களில் ☐ 3. ஆறு முதல் பத்து நாட்களில் ☐ 4. பதினொன்று முதல் பதினைந்து நாட்களில் ☐ 5. சொல்ல இயலாது
19. நீங்கள் மீன்பிடிக்கச்செல்லும் பொழுது சராசரியாக ஒரு மாதத்தில் கடலில் தங்கும் நாட்களின் எண்ணிக்கை ?	☐ 1. ஒரு வாரத்திற்கும் குறைவாக ☐ 2. ஒன்று முதல் இரண்டு வாரங்கள் ☐ 3. இரண்டு முதல் மூன்றுவாரங்கள் ☐ 4. மூன்று முதல் நான்கு வாரங்கள்

பிரிவு ஆ ; நோயுறும் தன்மை

20. உங்களுக்கு மருத்துவர் எப்பொழுதாவது நீரிழிவு நோய் உள்ளதாக கூறியுள்ளரா?	☐ 1. ஆம் ☐ 2. இல்லை
21. உங்களுக்கு மருத்துவர் எப்பொழுதாவது உயர் இரத்த அழுத்தம் உள்ளதாக கூறியுள்ளரா?	☐ 1. ஆம் ☐ 2. இல்லை
22. கடந்த இரண்டு வருடங்களில் ,தினந்தோறும் இருமலினால் மூன்று மாதங்களுக்கு மேல் பாதிபுக்குள்ளானிர்களா?	☐ 1. ஆம் ☐ 2. இல்லை
23. கண்களால் பார்ப்பதில் உங்களுக்கு சிரமமாக உள்ளதா?	☐ 1. ஆம் ☐ 2 இல்லை
24. காது கேட்பதில் உங்களுக்கு சிரமமாக உள்ளதா?	☐ 1. ஆம் ☐ 2. இல்லை

25. உங்களுக்கு முதுகு அல்லது மூட்டுகளில் வலி உள்ளதா ?	☐ 1. ஆம் ☐ 2. இல்லை

பிரிவு இ : ஆபத்து காரணிகள்

26. உங்கள் இரத்த சம்பந்தமான உறவுகளில் யாராவது நீரிழிவு நோயினால் பாதிக்கப்பட்டுள்ளனரா ?	☐ 1. ஆம் ☐ 2. இல்லை ☐ 3. தெரியாது
27. உங்கள் இரத்த சம்பந்தமான உறவுகளில் யாராவது உயர் இரத்த அழுத்தத்தினால் பாதிக்கப்பட்டுள்ளனரா	☐ 1. ஆம் ☐ 2. இல்லை ☐ 3. தெரியாது
28. காலை 9 மணி முதல் மாலை 5 மணி வரை உள்ள காலத்தில் வேலை நாட்களில்,பொதுவாக எத்தனை மணி நேரம் எந்த வித நிழலுக்குள் வராமல் வேலை பார்த்துக்கொண்டு இருப்பீர்கள்?	
29. நீங்கள் பகலில் மீன் பிடிக்கும்போது உங்களை சூரிய ஒளியில் இருந்து பாதுகாத்துக்கொள்ள ஏதேனும் பாதுகாப்பு சாதனங்களை உபயோகப்படுத்துகிறீர்களா	☐ 1. ஆம் ☐ 2. இல்லை
30. வேலை நேரத்தில் பெரும்பாலும் படகில் எங்கு இருப்பீர்கள்?	☐ 1. மோட்டார் அறை ☐ 2. படகு தளம் ☐ 3. மற்றவை.....
31. வேலை நேரத்தில் நீங்கள் மற்றவர்களுக்கு கேட்பதிற்கு உரத்த சத்தத்துடன் பேச வேண்டுமா?	☐ 1. ஆம் ☐ 2. இல்லை
32. நீங்கள் மீன் பிடிக்கும்போது அதிக ஓலி இடையூரிலிருந்து உங்களை பாதுகாத்துக்கொள்ள ஏதேனும் பாதுகாப்பு சாதனங்களை உபயோகப்படுத்துகிறீர்களா?	☐ 1. ஆம் ☐ 2. இல்லை
33. நீங்கள் உங்களை மீண்டும் மீண்டும் ஒரே விதமான வேலை பணிசுமையில் ஈடுபடுத்திக்கொள்விர்களா?	☐ 1. ஆம் ☐ 2. இல்லை
34. கடந்த ஒரு வருடத்தில் வேலை நிமித்தமான காயங்கள் ஏதேனும் உங்களுக்கு ஏற்பட்டுள்ளதா?	☐ 1. ஆம் ☐ 2. இல்லை

பிரிவு ஈ: தனிப்பட்ட விபரங்கள்

35. தற்பொழுது உங்களுக்கு புகை பிடிக்கும் பழக்கம் உள்ளதா?	☐ 1. நாளில் ஒரு முறை ☐ 2. நாளில் இரு முறை ☐ 3. நாளில் மூன்று முறை ☐ 4. மூன்றீற்கு மேல் ☐ 5. இல்லை
36. ஆம் எனில் உங்களுக்கு புகை பழக்கம் எவ்வளவு காலமாக உள்ளது?	
37. தற்பொழுது உங்களுக்கு மது அருந்தும் பழக்கம் உள்ளதா?	☐ 1. தினமும் ☐ 2. வாரத்தில் ஒரு முறை ☐ 3. வாரத்தில் இரு முறை ☐ 4. வாரத்தில் மூன்று முறை ☐ 5. மூன்றீற்கு மேல் ☐ 6. இல்லை
38. ஆம் எனில் உங்களுக்கு மது அருந்தும் பழக்கம் எவ்வளவு காலமாக உள்ளது?	
39. உங்கள் அன்றாட வேலை தவிர 30 நிமிடங்களுக்கு மேல் உடற்பயிற்சி செய்கின்றீர்களா?	☐ 1. தினமும் ☐ 2. வாரத்தில் ஒரு முறை ☐ 3. வாரத்தில் இரு முறை ☐ 4. வாரத்தில் மூன்று முறை ☐ 5. மூன்றீற்கு மேல் ☐ 6. இல்லை
40. சராசரியாக ஒரு மாதத்திற்கு உங்கள் குடும்பம் எவ்வளவு உப்பு வாங்குகின்றார்கள்?	.....கிலோகிராம்
41. உங்கள் குடும்பம் சமையல் செய்ய வழக்கமாக எனன வகையான எண்ணெய் வாங்குகின்றார்கள்?	☐ 1.பாமாயில் ☐ 2.தேங்காய் எண்ணெய் ☐ 3.சுத்திகரிக்கப்பட்ட எண்ணெய் ☐ 4.மற்றவை

கே. எண்	உணவு வகைகள்	தின மும்	வாரத் தில் ஒரு முறை	வாரத்தில் இரு முறை	வாரத்தில் மூன்று முறை	வாரத்தில் மூன்றீற்கு மேல்	இல் லை
42	குழம்பு மீன்						
43	வறுத்த மீன்						
44	கருவாடு						
45	காய்கறி கள்						
46	பழங்கள்						
47	நொறுக் கு தீனிகள்						

பிரிவு உ: உடல் பரிசோதனை

48. **உயரம்**	(**செ.மீ**)
49. **எடை**	(**கி.கி**)
50. **இடுப்பு சுற்றளவு**	(**செ.மீ**)
51. **உடல் பருமன்**	
52. **இரத்த அழுத்தம்**	**முதல் அளவு** **இரண்டாம் அளவு**
53. **இரத்த சர்க்கரையின் அளவு** (PPBS)	mg/dl
54. **பார்வை திறன்**	**வலது கண்** .....**இடது கண்** .....
55. **கேட்கும் திறன்**	**வலது காது** ..... **இடது காது** .....
56. **எலும்பு இணைப்பு**	**வீக்கம்** .....
57. **தசைகள்**	**இயக்கங்கள்** (**தடை/ தடையற்ற இயக்கங்கள்**).....

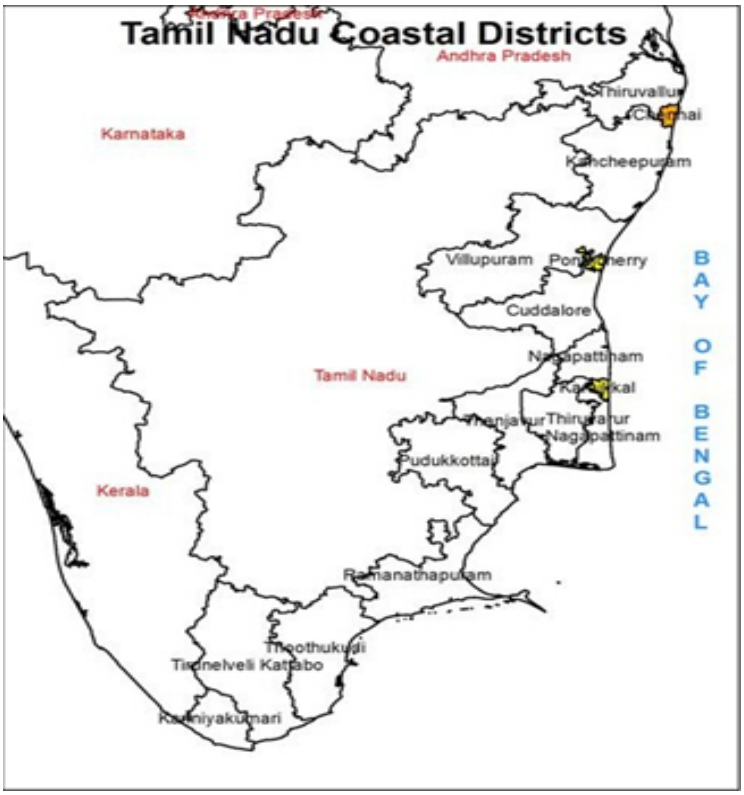
ANNEXURE- IV

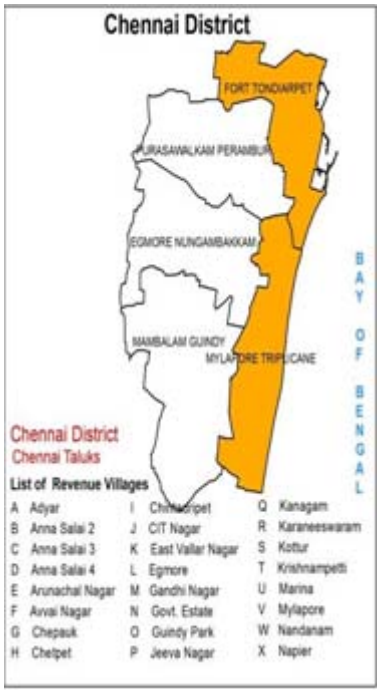
MODIFIED KUPPUSWAMY SOCIOECONOMIC SCALE

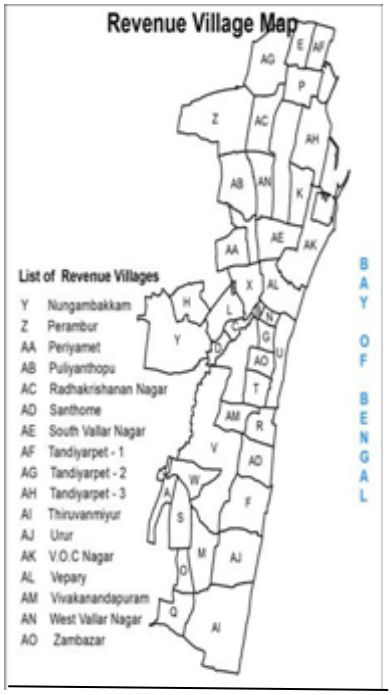
Characteristics	Category	score
EDUCATION	Profession or honours	7
	Graduate or post graduate	6
	Intermediate or post high school diploma	5
	High school certificate	4
	Middle school certificate	3
	Primary school certificate	2
	Illiterate	1
OCCUPATION	Profession	10
	Semi profession	6
	Clerical, shop owner, farmer	5
	Skilled worker	4
	Semi-skilled worker	3
	Unskilled worker	2
	Unemployed	1
INCOME (2012 current price index)[85]	≥31507	12
	15754- 31506	10
	11817- 15753	6
	7878- 11816	4
	4727- 7877	3
	1590- 4726	2
	≤ 1589	1
SOCIOECONOMIC STATUS	Upper	26- 29
	Upper middle	16- 25
	Lower middle	11- 15
	Upper lower	5- 10
	Lower	<5

ANNEXURE- V

STUDY AREA MAP







ANNEXURE- VI

LIST OF CLUSTERS IN NORTH CHENNAI COASTAL DISTRICT

S.no	Cluster (fishing village)	Population(adult males)	Cumulative frequency
1	Ashok nagar	119	119
2	Poondi Thangammal colony	342	461
3*	Anna nagar	455	916
4	Poongavanam kuppam	348	1264
5*	Nagoorar Thotam	1036	2300
6	Pallavan nagar and Thideer nagar	274	2574
7*	Powerkuppam	437	3011
8	Pudhumanaikuppam	341	3352
9	Kasipuram A block	563	3915
10*	Kasipuram B block	1076	4991
11*	C.G.Colony	960	5951
12*	Y.M.C.A kuppam	324	6275
13*	Vinayagapuram	175	6450
14	V.O.C nagar	397	6847
15*	Singaravel nagar	1086	7933
16*	Muthamizh nagar	701	8634
17*	Kasimanagar	577	9211
18*	Jeevarathinam nagar	1277	10488
19	A.J.Colony	541	11029
20*	Kasithotam	765	11794
21*	Bentlemen Garden	417	12211
22	G.M.Pettai	1362	13573
23*	Pudhukamaraj nagar	732	14305
24*	Attapalayam	394	14699
25	Panaimarathotti	473	15172
26*	Royapuram	787	15959
	Total		**15959**

*** indicates selected cluster**

ANNEXURE- VII

KEY TO MASTER CHART

Variable	Label	Coding
S.no	Serial number	1, 2 etc
Age	Age of the fishermen	19, 20, 21……..years
Education	Education of the fishermen	1=Illiterate 2=Primary 3=Secondary 4=Higher Secondary 5=College 6=Others
Marriage	Marital status of the fishermen	1=Yes 0=No
Alternate_job	Any other job done other than fishing	1=Yes 0=No
House	Residing in own house	1=Yes 0=No
Members	Total members in the family	3, 4…….
Income	Total income of the family	In rupees
Experience	Total years in fishing job	20, 21,22……years
Boat_owner	Fishing job in own boat	1=Yes 0=No
Boat_type	Nature of the boat used	1=mechanized 2=non mechanized 3=both
Fishing_trip	Duration of single fishing trip	1.Daily 2.Once in 2 to 5 Days 3. Once in 6 to 10 Days 4. Once in 11 to 15 Days
Working_days	Average number of fishing days per month	1. Less than a week 2. 1- 2 weeks 3. 2- 3 weeks 4. 3- 4 weeks
DM_his	Already a known diabetic	1=Yes 0=No
HT_his	Already a known hypertensive	1=Yes 0=No
Chr_cough	History of chronic cough	1=Yes 0=No
Vis_his	History of visual impairment	1=Yes 0=No
Hear_his	History of hearing impairment	1=Yes 0=No
Muscle_his	History of musculoskeletal disorder	1=Yes 0=No
F/H_DM	Family history of diabetes	1=Yes 0=No
F/H_HT	Family history of hypertension	1=Yes 0=No
Sun exposure	Duration of sun exposure at work	1, 2, 3……hours
PPE_sun	Personal protection against sunlight	1=Yes 0=No

Work place	Working area in the boat	1= engine room 2= deck of the boat 3= others
Noise exposure	Noise exposure on board	1=Yes 0=No
PPE_noise	Personal protection against noise	1=Yes 0=No
Repetitive task	Involvement in repetitive work	1=Yes 0=No
Occupational injuries	History of occupational injuries	1=Yes 0=No
Smoking_freq	Frequency of cigarettes smoked per day	1= Once in a day 2= Twice in a day 3= Thrice in a day 4= More than thrice a day 5= Never
Smoking_years	Total duration of smoking	1, 2, 5……..years
Alcohol_freq	Frequency of intake of drink containing alcohol	1= Every day 2= Weekly once 3= Weekly twice 4= Weekly thrice 5= More than thrice a week 6= Never
Alcohol_years	Total duration of alcohol use	1, 2, 5……..years
Exercise	Regular exercise outside of work	1=Yes 0=No
Salt	Average monthly salt purchased in the family	1, 2…kilograms, 0=no response
Oil_type	Type of oil used for cooking	1= palm oil 2= coconut oil 3= refined oil 4= others
Cooked fish	Frequency of cooked fish consumption	1= everyday 2= weekly once 3= weekly twice 4= weekly thrice 5= more than thrice a week 6= never
Fried fish	Frequency of fried fish consumption	1= everyday 2= weekly once 3= weekly twice 4= weekly thrice 5= more than thrice a week 6= never

Salted dried fish	Frequency of salted dried fish consumption	1= everyday 2= weekly once 3= weekly twice 4= weekly thrice 5= more than thrice a week 6= never
Fruits	Frequency of fruits consumption	1= everyday 2= weekly once 3= weekly twice 4= weekly thrice 5= more than thrice a week 6= never
Vegetables	Frequency of vegetable consumption	1= everyday 2= weekly once 3= weekly twice 4= weekly thrice 5= more than thrice a week 6= never
Snacks	Frequency of consumption of snacks/packed foods	1= everyday 2= weekly once 3= weekly twice 4= weekly thrice 5= more than thrice a week 6= never
Height	Height of the participant	In centimeters
Weight	Weight of the participant	In kilograms
Waist circumference	Measurement of waist size in the participant	In centimeters
BMI	Body mass index calculated with weight and height	In kg/m^2
Blood pressure_sys	Systolic blood pressure measured in the participant	In mmHg
Blood pressure_dia	Diastolic blood pressure measured in the participant	In mmHg
PPBS	Blood sugar measured in the participant	In mg/ dl
VA_right	Visual acuity in the right eye	1= normal, 0= impaired
VA_left	Visual acuity in the left eye	1= normal, 0= impaired
Hear_right	Tunic fork test in right ear	1= normal 0= diminished
Hear_left	Tunic fork test in left ear	1= normal 0= diminished
Joint_swell	Swelling of the joint	1=Yes 0=No
Muscle_pain	Pain on bending the back muscles	1=Yes 0=No

Master Chart

MASTER CHART

S.no	name	age	education	marriage	Alternate_job	house	members	Income	experience	boat_owner	boat_type	fishing_trip	working_days	DM_his	HT_his	Chr_cough	Vis_his	hear_his	muscle_his	F/H_DM	F/H_HT	Sun exposure	PPE_sun	work place	Noise exposure	PPE_noise	repetitive task	Occupational injuries	Smoking_freq	Smoking_years	Alcohol_freq	Alcohol_years	Exercise	salt	oil_type	cooked fish	Fried fish	Salted dried fish	vegetables	fruits	snacks	Height	Weight	waist circumference	BMI	Blood pressure_sys	Blood pressure_dia	PPBS	VA_right	VA_left	Hear_right	Hear_left	joint_swell	Muscle_pain
1	rajendran	44	1	0	0	1	3	4000	30	0	2	2	1	0	0	0	1	1	1	1	0	5	1	2	1	0	1	0	4	22	6	0	1	0	3	5	1	2	1	2	2	166	81.4	98	29.53985	120	80	110	1	0	1	0	0	1
2	mayandi	51	2	1	0	1	7	10,000	40	1	2	3	2	1	0	0	1	0	1	1	0	2	0	2	0	0	0	1	1	30	1	30	6	1	3	5	7	7	3	2	6	165	80.8	105	29.6786	150	70	260	1	1	1	1	0	1
3	raja.k	41	1	1	0	0	4	10,000	30	0	2	3	3	0	1	0	1	0	1	1	1	6	0	1	0	0	1	0	5	0	3	22	6	6	3	4	5	6	4	1	1	172	88.5	103	29.91482	140	80	233	1	1	1	1	0	1
4	krishnan	60	1	1	0	1	3	13,000	45	0	1	1	1	0	0	1	1	0	1	0	0	3	0	2	1	0	1	0	4	45	5	40	6	1	1	1	3	3	6	1	6	161	53.6	79	20.67821	120	70	90	0	0	0	0	0	0
5	vimalnathan	23	3	0	0	0	3	10,000	6	0	2	2	1	0	0	0	1	1	1	1	1	8	0	2	1	0	1	1	6	5	1	2	6	2	1	1	2	2	1	1	1	179	64.3	77	20.06804	110	80	94	1	1	1	1	0	0
6	gopi	55	1	1	0	1	6	1000	30	0	1	1	4	0	0	1	1	1	1	0	0	6	1	2	1	0	0	0	4	20	1	20	6	1	1	1	2	2	7	2	163	43.7	68	16.44774	100	70	95	1	0	0	0	0	1
7	pandian	47	1	1	1	1	5	10,000	31	0	2	1	3	0	1	0	0	0	0	0	1	5	0	2	1	0	1	0	5	0	5	30	1	4	3	1	2	2	6	2	6	160	72.6	101	28.35938	150	110	110	0	1	0	1	0	1
8	tamilmani	50	1	1	0	1	10	5000	25	0	2	3	3	0	0	0	0	0	1	0	0	2	0	1	1	0	0	0	4	29	2	25	6	1	3	1	1	2	1	1	1	164	52.5	74	19.51963	100	70	114	1	1	0	1	0	1
9	desingh	53	1	1	0	1	1	3,000	35	0	2	2	2	0	0	0	1	0	1	0	0	4	0	2	1	0	1	0	5	0	3	20	6	2	1	3	2	2	1	1	1	160	49.6	74	19.375	100	70	130	0	0	0	0	0	1
10	saravanan	35	4	1	1	0	5	6000	21	0	2	2	3	0	0	0	0	0	1	0	0	6	0	2	1	0	1	1	1	10	2	12	6	2	3	5	4	3	5	3	3	164	58	77	21.56454	100	70	95	1	1	1	1	0	1
11	murugan	38	2	1	1	0	4	6,000	28	0	2	2	3	0	0	0	1	0	0	0	0	2	0	2	0	0	1	1	4	20	5	20	6	5	1	1	1	2	2	6	1	171	56.5	76	19.32218	130	80	97	0	0	1	1	0	1
12	ramachandran	42	2	1	1	0	4	3,000	33	0	2	4	3	0	0	0	1	0	1	0	0	7	0	2	1	0	1	1	3	6	1	7	6	1	1	1	2	2	1	6	6	174	57.6	69	19.02497	110	80	95	1	1	1	1	0	1
13	subramanian	51	1	1	0	1	6	7,000	39	0	2	2	3	0	0	0	1	1	1	0	0	3	0	1	1	0	1	1	4	1	2	30	6	2	1	1	2	3	6	3	2	171	94.7	106	32.38603	190	110	117	0	1	0	1	0	1
14	paramasivan	40	1	1	0	1	4	5000	30	0	2	2	1	1	0	0	1	0	1	0	0	3	0	2	0	0	1	0	5	0	1	20	6	1	1	1	3	2	4	6	6	154	53.2	87	22.43211	110	80	272	1	1	1	1	0	0
15	arunmozhi	59	2	1	0	0	4	3000	49	1	1	1	4	0	0	0	1	0	1	0	0	6	0	2	0	0	1	0	5	0	1	29	1	2	3	2	1	7	3	7	7	176	92	106	29.70041	150	100	175	1	1	0	1	0	1
16	vijaykumar	52	2	1	0	1	4	5,000	30	0	2	2	2	0	0	0	1	0	1	0	0	5	0	3	0	0	1	0	4	20	3	20	6	0	3	1	3	7	2	1	2	165	47.5	74	17.4472	100	80	130	1	1	1	1	0	1
17	senthilkumar	35	4	1	1	0	3	7000	25	1	2	2	3	0	1	1	0	0	0	1	1	6	0	1	1	0	0	1	4	10	2	4	6	1	1	5	4	2	1	2	1	165	64.1	88	23.54454	120	90	133	1	1	1	1	0	1
18	kussain	52	4	1	0	0	3	5000	32	0	2	4	2	0	0	0	1	0	1	0	0	7	0	2	0	0	1	1	4	20	3	15	6	2	3	1	2	2	4	2	6	158	54.1	82	21.67121	100	70	95	1	1	0	1	0	1
19	rajendran	50	1	1	0	0	6	12,000	30	0	2	2	2	0	0	1	0	0	1	0	0	3	0	2	0	0	1	1	4	30	1	30	6	1	1	1	2	6	2	2	1	172	61	86	20.61925	130	90	98	1	1	1	1	0	1
20	kumar	48	3	1	0	1	4	6000	28	0	2	3	1	0	0	0	1	0	0	1	1	6	0	2	1	0	0	0	5	0	6	0	6	1.5	3	1	3	2	3	4	1	174	74.7	86	24.67301	120	80	104	1	1	1	0	0	1
21	vignesh	28	3	1	0	0	4	10000	10	0	2	2	1	0	0	0	1	0	0	0	0	5	0	2	1	0	1	0	6	5	1	0.2	6	0	1	1	3	2	3	2	2	160	80.4	95	31.40625	140	90	138	1	1	1	1	0	1
22	paramasivan	42	1	0	0	1	5	6000	32	0	2	3	3	0	1	0	1	0	1	0	1	6	0	2	1	0	1	1	4	10	3	20	6	1	1	4	3	2	1	6	1	172	70.9	95	23.96566	160	120	94	1	1	1	1	0	1
23	selvam	56	2	1	0	1	5	3000	40	0	1	1	1	0	0	0	1	0	1	0	0	5	0	2	1	0	1	0	4	40	2	4	6	2	1	1	2	2	3	4	1	160	50.2	72	19.60938	130	70	110	1	1	1	0	0	0
24	babu	44	3	1	0	1	4	4000	25	0	2	1	1	0	0	0	1	0	1	1	1	6	0	2	1	0	1	1	4	5	1	10	6	1	3	1	4	3	3	3	6	163	46.1	68	17.35105	100	80	97	1	1	1	1	0	1
25	arumugam	49	1	1	0	1	4	6000	40	0	1	1	1	0	0	1	0	0	1	0	0	5	0	2	1	0	1	0	4	30	1	40	6	2	3	1	2	2	4	2	6	160	47.5	69	18.55469	160	100	114	1	1	1	0	0	0
26	devaraj	49	2	1	0	1	4	3000	29	0	2	3	4	0	0	0	0	0	0	1	1	3	0	1	1	0	1	1	2	1	5	24	6	2	3	4	3	2	2	6	6	166	81.6	107	29.61243	130	100	84	1	1	1	1	0	1
27	sekar	46	1	1	0	1	2	8000	3	0	2	2	3	1	0	1	1	1	1	1	1	1	0	2	1	0	0	0	4	20	5	20	6	2	3	1	5	7	7	6	1	175	74.7	94	24.39184	140	90	210	1	1	0	1	0	1
28	dinesh	31	3	1	1	0	3	5000	5	0	1	1	4	0	0	0	1	1	1	0	0	5	0	2	1	0	1	0	5	0	1	5	6	5	3	5	2	2	3	6	1	172	54.9	71	18.55733	90	40	103	1	1	0	1	0	0
29	selvakkumar	32	1	1	0	1	5	15000	20	0	2	3	3	0	0	0	1	1	1	0	0	5	0	2	0	0	1	0	4	10	5	5	6	2	3	1	5	7	2	1	6	158	58.5	83	23.43374	120	80	84	1	1	1	0	0	0
30	vicky	21	2	1	0	1	5	15000	7	0	2	3	1	0	0	0	0	0	0	0	0	5	0	2	0	0	1	1	6	4	1	5	1	0	1	1	2	2	2	1	2	170	49.9	69	17.26644	120	80	80	1	1	1	1	0	1
31	marimuthu	44	3	1	0	0	5	10000	28	0	2	3	3	0	0	0	1	0	1	1	0	5	0	2	1	0	1	1	4	10	2	10	1	4	3	4	3	2	1	2	6	158	73.4	95	29.40234	130	90	75	1	1	1	1	0	0
32	ramu	33	2	1	1	0	4	5000	12	0	2	4	2	0	0	0	0	0	1	0	0	6	0	2	1	0	1	1	5	0	3	15	6	7	1	1	1	6	2	7	2	168	67.3	84	23.84495	130	90	80	1	1	1	1	0	1
33	tulsi	55	3	1	1	1	3	4000	45	0	2	3	2	1	0	0	1	0	1	0	0	8	0	3	1	0	0	0	4	35	5	40	1	2	3	5	2	6	1	3	6	160	75.3	102	29.41406	140	90	290	1	1	1	1	0	1
34	govindan	25	1	0	0	1	3	12000	15	0	2	3	3	0	0	0	0	0	1	0	0	5	0	2	1	0	1	0	5	0	6	0	6	1	1	1	1	2	2	2	1	167	70.5	88	25.27878	120	80	74	1	1	1	1	0	1
35	prasad	23	3	0	1	1	4	15000	15	0	1	1	1	0	0	1	1	1	1	0	0	7	0	1	1	0	1	1	5	0	6	0	6	0	6	1	1	4	2	2	2	2	1	173	74.6	86	24.92566	120	80	80	1	1	1	1	0	0
36	dhanasealan	46	3	1	0	1	3	7000	27	1	2	4	4	1	1	0	1	0	0	1	1	3	0	2	1	0	1	1	5	0	6	0	2	2	3	1	4	7	2	4	1	165	62	74	22.773	130	80	212	1	1	1	1	0	1
37	kandavel	30	3	1	0	1	3	8000	10	1	1	1	4	0	0	0	0	0	0	0	0	5	0	2	0	0	1	0	5	0	6	0	6	0	3	4	3	7	4	2	3	175	69.6	86	22.72653	110	70	102	1	1	1	1	0	1
38	vinnalasealan	48	2	1	0	1	4	8000	38	1	2	4	2	1	0	0	1	0	0	1	0	3	0	2	1	0	1	0	5	0	6	0	6	1	3	4	2	2	4	1	6	160	77.5	101	30.27344	180	120	180	1	1	1	1	0	1
39	gangadharan	59	3	1	0	1	7	5000	40	1	1	1	4	0	0	0	0	0	1	0	0	6	0	2	0	0	1	0	4	45	1	45	6	0	1	1	1	2	1	6	1	158	57.2	79	22.91299	180	90	98	1	1	1	1	0	1
40	deisigh	57	1	1	0	1	5	8000	40	0	2	2	2	0	0	1	1	0	1	0	0	2	0	2	0	0	0	1	1	20	5	25	6	2	3	4	4	7	1	3	6	165	50.1	69	18.4022	120	80	96	0	0	1	1	0	0
41	manojkumar	24	3	0	1	1	5	10000	8	0	2	3	2	0	0	0	0	0	1	0	0	6	1	2	0	0	1	0	5	0	6	0	6	0	1	4	3	2	3	4	1	177	77.9	80	24.86514	130	90	100	1	1	1	1	0	0
42	adesh	22	4	1	0	1	4	10000	4	0	2	1	4	0	0	0	0	0	1	0	0	3	0	2	0	0	1	0	5	0	6	0	4	0	3	6	1	3	3	1	1	165	75.2	86	27.62167	110	70	83	1	1	1	1	0	0
43	dhanasekaran	30	2	1	0	0	4	10000	20	0	2	3	2	0	0	0	0	1	1	0	0	6	0	2	0	0	1	0	5	0	1	10	6	3	1	1	4	7	2	2	1	155	57.5	80	23.9334	130	100	106	1	1	1	1	0	1
44	kattaboman	21	3	1	0	1	5	3000	0.5	0	1	1	4	0	0	0	0	0	0	0	0	6	0	2	0	0	1	0	5	0	1	6	6	0	1	1	2	1	1	6	1	156	51.5	72	21.16206	120	90	79	1	1	1	1	0	1
45	karthick	32	3	1	0	0	5	3000	20	0	1	1	4	0	0	0	0	0	0	0	0	5	0	2	0	0	1	0	5	0	2	3	6	0	1	3	4	2	3	1	1	169	90.6	104	31.72158	120	80	89	1	1	1	1	0	1
46	udhaykumr	48	2	1	0	1	4	5000	30	0	2	2	1	0	0	0	1	0	1	0	0	4	0	2	0	0	1	1	5	0	3	20	2	0	3	1	3	7	3	1	7	180	94.5	114	29.16667	110	70	87	1	0	1	1	0	1
47	raj	65	1	1	0	1	5	5000	55	0	2	1	1	1	1	0	1	0	1	0	0	8	1	2	0	0	1	1	4	25	1	30	6	0	3	4	6	6	4	2	2	156	58.6	93	24.07955	160	70	194	1	1	0	1	0	1
48	kanniyappan	58	1	1	0	1	6	5000	30	0	2	1	3	0	0	0	1	0	0	0	0	8	0	2	0	0	0	0	5	0	6	0	6	0	1	1	2	6	2	2	6	181	74.1	97	22.61836	180	80	143	1	1	1	1	1	1
49	kumar	50	2	1	0	1	3	6500	25	0	2	2	1	0	0	0	1	0	1	0	0	8	0	2	0	0	1	1	4	30	5	33	6	1	3	1	2	2	3	4	7	168	69.6	103	24.65986	140	100	135	1	1	1	1	0	1
50	subramanian	52	2	1	0	0	6	5000	28	0	2	3	2	0	0	0	1	0	1	0	0	5	0	2	0	0	0	1	4	25	2	20	6	0	1	1	2	3	2	1	6	178	63.7	88	20.10478	120	70	157	1	1	1	1	0	1
51	anbu	56	2	1	0	1	2	5000	36	0	2	2	3	0	0	0	0	0	0	0	0	5	0	2	0	0	0	0	5	0	6	0	6	2	1	1	6	6	1	1	6	168	70.9	97	25.12046	150	100	162	1	1	1	1	0	1
52	johnbasko	50	2	1	0	0	2	6000	25	0	2	1	4	1	1	0	1	0	0	1	0	8	0	2	0	0	1	0	5	0	2	5	1	1	3	1	2	6	4	6	6	171	73.2	67	25.03334	160	100	245	0	0	1	1	0	1
53	rajalingam	48	2	1	0	1	4	6000	38	0	2	3	2	0	0	0	0	0	0	0	0	8	0	2	1	0	1	1	4	30	2	30	6	5	3	5	5	4	1	2	2	169	65.4	84	22.89836	130	80	79	1	1	1	1	0	1
54	sekar	56	2	1	0	0	6	7000	45	0	2	1	4	0	1	0	1	1	1	1	1	6	0	3	1	0	1	1	5	0	1	35	6	2	3	1	2	7	3	6	2	167	58.8	84	21.08358	170	100	78	0	0	0	1	0	1
55	devadhas	52	2	1	0	1	6	2000	40	0	2	2	1	0	0	0	1	0	0	0	0	4	0	1	0	0	0	0	5	0	1	20	6	0	1	1	1	6	2	1	6	165	50.1	72	18.4022	150	90	92	1	1	1	1	0	1
56	rajugandhi	29	2	1	0	1	7	3000	15	0	2	1	2	0	0	0	0	0	0	0	0	4	0	3	0	0	1	0	5	0	6	0	6	0	3	5	3	6	3	4	2	174	81.8	97	27.0181	130	80	84	1	1	1	1	0	1
57	senthilkumar	32	4	1	0	0	3	5000	7	0	2	2	2	0	0	0	0	0	0	1	0	8	0	2	0	1	1	0	5	0	2	10	6	1	3	1	1	3	1	1	1	185	57	71	16.65449	120	80	114	1	1	1	1	0	1
58	karunanithi	45	2	1	0	1	4	5000	20	0	2	3	2	0	0	0	0	0	1	1	1	4	1	1	0	0	1	0	5	0	2	10	2	3	2	4	6	6	1	1	6	171	74.3	96	25.40953	130	80	119	1	1	1	1	0	1
59	vadivel	64	2	1	0	1	5	5000	50	0	1	1	4	0	0	0	1	0	1	0	0	2	1	3	0	0	1	0	5	0	6	0	6	2	3	3	3	7	1	1	6	160	60.8	92	23.75	120	80	85	1	1	1	1	1	1
60	sundarlingam	45	2	1	0	1	4	7000	35	0	2	2	3	0	0	0	1	1	1	0	0	6	0	2	0	0	1	0	4	25	1	20	6	0	3	5	3	3	4	2	6	174	91.2	102	30.12287	140	100	85	1	1	1	1	1	0
61	sukumar	51	3	1	0	1	4	20000	35	0	2	4	4	0	0	0	1	0	1	0	0	6	0	2	0	0	1	0	4	36	1	25	6	0	1	3	1	1	2	2	6	164	80.8	104	30.04164	130	90	89	1	1	0	0	0	1
62	raja	38	3	1	0	1	6	12000	20	0	2	3	3	0	0	0	0	0	1	0	1	6	0	2	1	0	1	0	4	20	5	15	6	0	1	4	1	7	3	2	6	174	85.9	103	28.37231	130	90	102	1	1	0	1	0	1
63	ashok	45	2	1	0	0	4	8000	20	0	2	2	2	0	0	0	0	0	0	0	0	8	0	2	0	0	1	0	4	20	4	20	6	0	1	1	2	7	1	1	6	174	54.2	72	17.90197	100	70	121	1	1	1	1	0	1
64	ganeshan	43	2	1	0	0	4	7000	8	0	3	2	2	0	0	0	0	0	1	0	0	8	0	2	1	0	1	0	4	5	6	0	6	1	3	7	3	6	1	7	6	154	53	80	22.34778	130	80	115	0	0	1	1	0	0
65	ahambaram	47	3	1	0	1	4	8000	25	0	2	2	3	0	0	0	1	0	0	0	0	6	0	2	1	0	1	0	5	0	2	20	6	1	3	1	1	7	1	2	6	168	68.5	89	24.27012	130	80	110	1	1	1	1	0	1
66	ramesh	41	2	1	0	0	4	8000	30	0	2	2	2	0	0	0	1	0	0	0	0	8	0	2	1	0	1	1	5	0	1	35	6	0	1	1	1	7	3	2	1	155	64.1	90	26.68	150	90	107	1	1	1	1	0	1
67	elamparthi	44	3	1	0	1	4	8000	25	0	2	3	3	0	0	0	1	0	0	0	0	4	0	2	0	0	1	1	4	25	5	25	6	0	1	1	4	7	2	1	1	168	78.5	94	27.81321	160	100	113	1	1	1	0	0	1
68	arumugam	56	2	1	0	0	6	8000	25	0	2	2	2	0	0	0	0	0	1	0	0	8	0	2	0	0	1	0	5	0	3	30	6	1	3	1	3	7	4	6	2	170	75.1	99	25.98616	170	100

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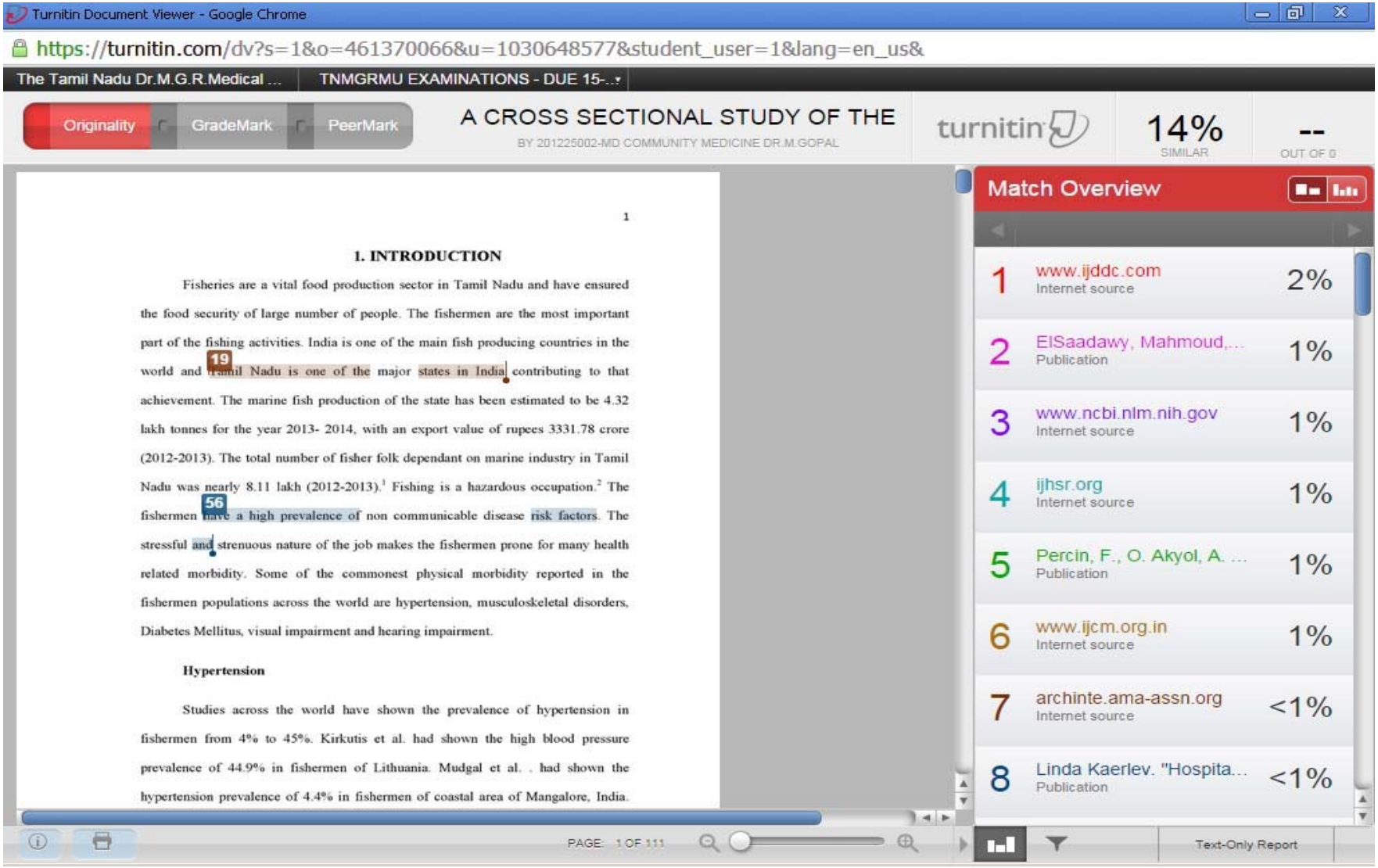
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1. INTRODUCTION
Fisheries are a vital food production sector in Tamil Nadu and have ensured the food security of large number of people. The fishermen are the most important part of the fishing activities. India is one of the main fish producing countries in the world and Tamil Nadu is one of the major states in India contributing to that achievement. The marine fish production of the state has been estimated to be 4.32 lakh tonnes for the year 2013- 2014, with an export value of rupees 3331.78 crore (2012-2013). The total number of fisher folk dependant on marine industry in Tamil Nadu was nearly 8.11 lakh (2012-2013).[1] Fishing is a hazardous occupation.[2] The fishermen have a high prevalence of non communicable disease risk factors. The stressful and strenuous nature of the job makes the fishermen prone for many health related morbidity. Some of the commonest physical morbidity reported in the fishermen populations across the world are hypertension, musculoskeletal disorders, Diabetes Mellitus, visual impairment and hearing impairment.
Hypertension
Studies across the world have shown the prevalence of hypertension in fishermen from 4% to 45%. Kirkutis et al. had shown the high blood pressure prevalence of 44.9% in fishermen of Lithuania. Mudgal et al. . had shown the hypertension prevalence of 4.4% in fishermen of coastal area of Mangalore, India.
Match Overview
1 www.ijddc.com Internet source 2%
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3 www.ncbi.nlm.nih.gov Internet source 1%
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ANNEXURE – X

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI-3

EC Reg No.ECR/270/Inst./TN/2013
Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr. M. Gopal,
M.D., Postgraduate
Institute of Community Medicine,
Madras Medical College, Chennai-3.

Dear Dr. M. Gopal,

The Institutional Ethics Committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled **"A Cross sectional study of the Physical Morbidity and their Risk Factors in Fishermen of Chennai District, 2014"** No.35062014

The following members of Ethics Committee were present in the meeting held on 03.06.2014 conducted at Madras Medical College, Chennai-3.

1.	Dr. C. Rajendran, M.D.	-- Chairperson
2.	Dr. R. Vimala, M.D., Dean, MMC, Ch-3.	-- Deputy Chair Person
3.	Prof. Kalaiselvi, MD., Vice-Principal, MMC, Ch-3	-- Member
4.	Prof. Nandhini, M.D. Inst. of Pharmacology, MMC, Ch-3.	-- Member
5.	Dr. G. Muralidharan, Director Incharge, Institute of Surgery	-- Member
6.	Prof. Md Ali, MD., DM., Prof & HOD of MGE, MMC, Ch-3.	-- Member
7.	Prof. Ramadevi, Director i/c, Biochemistry, MMC,Ch-3.	-- Member
8.	Prof. Saraswathy, MD., Director, Pathology, MMC, Ch-3.	-- Member
9.	Prof. Tito, Director, i/c. Inst. of Internal Medicine, MMC	-- Member
10.	Thiru. Rameshkumar, Administrative officer	-- Lay Person
11.	Thiru. S. Govindasamy, BABL, High Court, Chennai-1.	-- Lawyer
12.	Tmt. Arnold Saulina, MA MSW	-- Social Scientist

We approve the proposal to be conducted in its presented form.

Sd/Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

Member Secretary, Ethics Committee

ANNEXURE-XI

LOCAL AUTHORITY PERMISSION LETTER

From

Date: 13.2.14

The President

Chennai district Fishermen Cooperative federation

Chennai

To

Dr.V.V.Anantharaman

Director

Institute of Community Medicine

Madras Medical College, Chennai- 3

Sir,

Sub: field study- requisition for permission to conduct study on the fishermen of Royapuram fishing community assessing their physical morbidity- Reg.

Ref: letter from Dr.V.V.Anantharaman, Director, Institute of Community Medicine, Madras Medical College, Chennai- 600003, dt: 13.2.14

Dr.M.Gopal IIyear M.D, Institute of Community Medicine, Madras Medical College is permitted to do his dissertation titled "A cross sectional study of the physical morbidity and their risk factors in fishermen of Royapuram fishing community, Chennai, 2014".

For CHENNAI FISHERMEN CO-OP. FEDERATION.

Special Officer.

A. கணேசன்

தலைவர்

சென்னை மாவட்ட மீனவர் கூட்டுறவு இணையம் (X351)

தண்டையார்பேட்டை வட்டம், சென்னை மாவட்டம்

Copy to

Fishermen cooperative societies in Royapuram